1997-09-MA-FEIS-KAHULUI AIRPORT IMPROVEMENTS VOL.IV OF V

FINAL
ENVIRONMENTAL IMPACT STATEMENT

VOLUME IV OF V

KAHULUI AIRPORT IMPROVEMENTS
KAHULUI, MAUI, HAWAII

State Project No. AM1011-07

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

and

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

GOVERNOR, BENJAMIN CAYETANO

September 1997

Office of Environmental Quality Control
235 S. Beretania #702
Honolulu HI 96813
586-4185

DATE DUE

7-5-01

7-19-01

7-27-01

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
As lead Federal Agency pursuant to the National Environmental Policy Act of 1969

STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION
As lead State Agency pursuant to the Hawaii Revised Statutes, Chapter 343

FINAL ENVIRONMENTAL IMPACT STATEMENT

KAHULUI AIRPORT
PROPOSED AIRPORT MASTER PLAN IMPROVEMENTS
KAHULUI, MAUI, HAWAII

This Environmental Impact Statement (EIS) addresses the potential environmental impacts of the proposed airport master plan improvements including: extending and strengthening Runway 2-20; construction of a parallel Runway 2R-20L; land acquisition; new airport access roadway; commercial and general aviation facilities such as aircraft parking aprons, taxiways, navigational aids, etc.; jet blast protection; and an interim helicopter facility. The EIS also addresses the required information necessary for the State of Hawaii to obtain federal assistance for the development of surface access around the airport from the U.S. Federal Highway Administration, through the Intermodal Surface Transportation Efficiency Act (ISTEA). The EIS is submitted for review pursuant to the following public law requirements: Section 102(2)(c) of the National Environmental Policy Act of 1969; Hawaii Revised Statutes, Chapter 343; and 49 USC 47106.(c)(B) and (C) of the Airport and Airway Improvement Act of 1982, as amended.

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September 1997

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ENVIRONMENTAL IMPACT STATEMENT
KAHULUI AIRPORT IMPROVEMENTS

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NOTE: The shaded text within the Final EIS, indicates changes made to the text of the Draft EIS, pursuant to State of Hawaii, Department of Health, Administrative Rules, 11-200-18.

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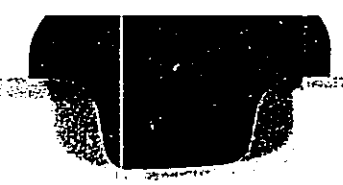

APPENDIX S

UPDATE OF HAWAII AVIATION DEMAND FORECASTS

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UPDATE OF HAWAII AVIATION DEMAND FORECASTS

Prepared for

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

October 1994

Prepared by

ARIES CONSULTANTS LTD.

in association with
Pacific Management Associates, Inc.

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SECTION 1.0

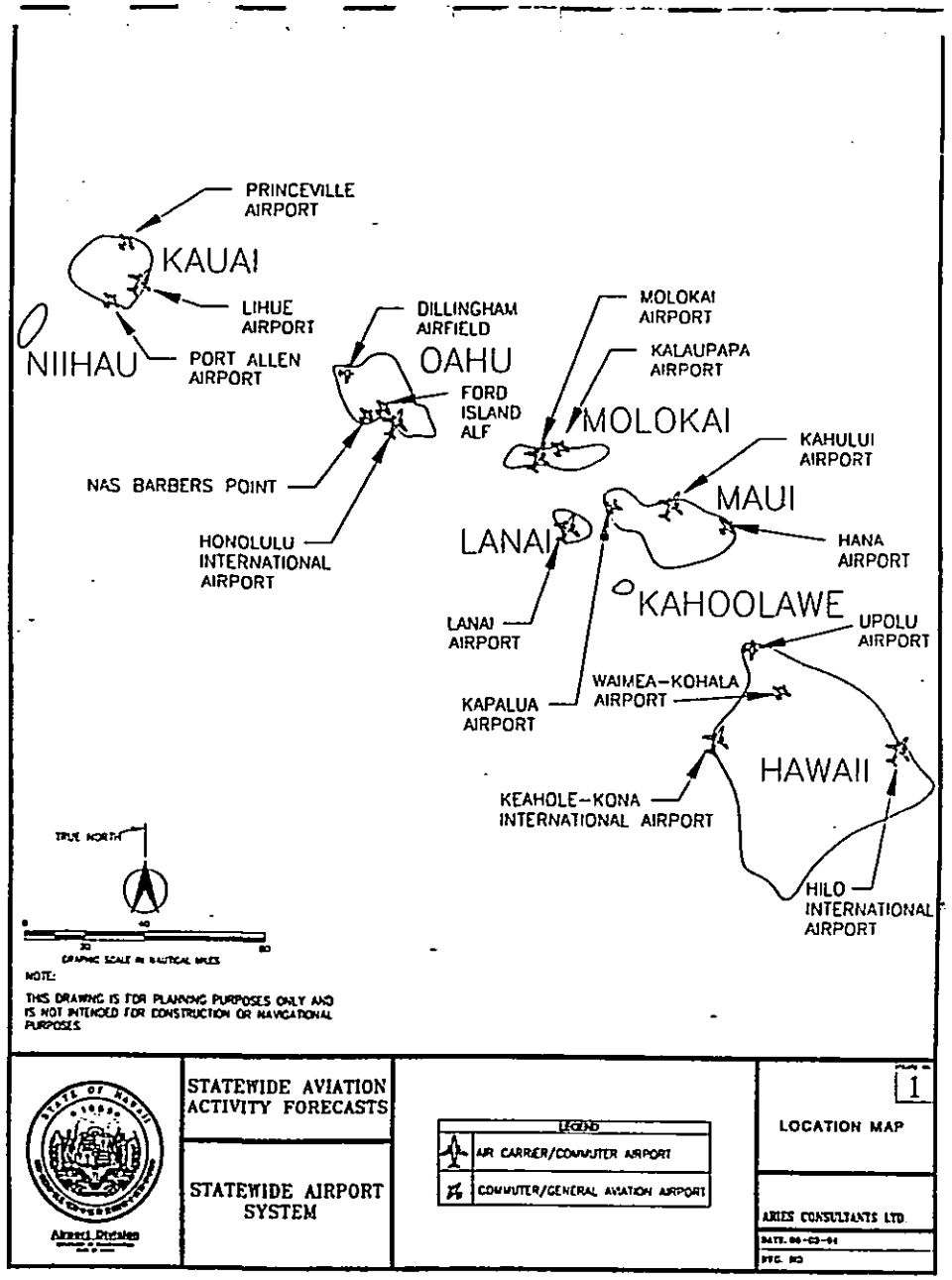
INTRODUCTION

This report has been prepared in response to the State of Hawaii, Department of Transportation, Airports Division's request to prepare updated Aviation Activity Forecasts for the State's Airports System. The State's Airports System is comprised of fourteen airports with the recent acquisition of the Kapalua Airport. Honolulu International Airport is the State's principal airport and at present is the only port of entry for scheduled international flights. The Keahole-Kona International and Kahului Airports on the Neighbor Islands receive direct service from the U.S. Mainland. (Direct service from the U.S. Mainland to Lihue Airport was suspended in 1993.) The locations of the State's airports in relation to one another are presented on Figure 1.

In response to a rapidly growing economy, the (then) Department of Business and Economic Development prepared economic and population projections for Hawaii for use by State and County agencies and the business community. These projections were published in November 1988 in the report *Population and Economic Projections for the State of Hawaii to 2010 (Series M-K)*. The most recent Statewide aviation activity forecasts were prepared in 1989 as part of the Statewide Airport System Plan at a time when the visitor industry in Hawaii was experiencing significant increases in visitor arrivals, particularly eastbound visitors from Japan.The 1989 Statewide Aviation Activity Forecasts were based on projections made in the M-K Series.

Section 2.0 presents the historical and projected visitor industry and population data on a Statewide basis and for the Neighbor Islands. The State's official planning projections, published in the 1988 M-K Series, have not been updated to reflect the decrease in visitor arrivals during 1991, 1992 and 1993 and other more recent economic and demographic data. Therefore, planning projections prepared by various State agencies and others were reviewed as part of this study and are presented in Section 2.0. Information on the existing and planned visitor plant inventory was analyzed based on data provided by the Hawaii Visitors Bureau.

Several forecasting methodologies were used to project the passenger demand forecasts on a Statewide and individual county basis which produced a high and low range of passenger demand forecasts through the year 2020. The forecasting techniques and the results were presented and discussed with Airports Division representatives and others before proceeding with the more detailed analysis. The forecast assumptions and the methodologies used for



preparing the high and low range of passenger demand forecasts are presented in Section 3.0. A comparison of alternative passenger forecasts prepared for the State's airports, including the passenger forecasts based on the 1988 M-K Series, is also presented in Section 3.0.

Forecasts for two scenarios of future international passenger activity were prepared for both the high and low forecasts. Scenario One assumes all international flights will continue to be processed through Honolulu International Airport. Scenario Two assumes some international flights will be nonstop to and from the Neighbor Islands within the forecast horizon. Forecast passenger activity Statewide and for the Neighbor Island airports under Scenario One for the high and low range of forecasts is presented and discussed in Section 4.0.

Based on an analysis of the historical data and discussions with State Airports personnel and others as appropriate, the updated aviation demand forecasts, including air cargo and mail, aircraft operations and based aircraft were prepared for each of the State's airports and are presented in Section 5.0.

The passenger activity forecasts that would occur under Scenario Two for Honolulu International, Keahole-Kona International and Kahului Airports are discussed and presented in Section 6.0.

Estimates of peak period activity at Honolulu International, Hilo International, Kahului, Keahole-Kona International and Lihue Airports are presented in Section 7.0 for passengers and aircraft operations.

SECTION 2.0

HISTORICAL AND PROJECTED VISITOR INDUSTRY AND POPULATION DATA

Information on the historical and projected socioeconomic and visitor industry activity are presented in this section for the City and County of Honolulu and the counties of Hawaii, Kauai and Maui. The socioeconomic data include the historical and available projected population and employment data for the four counties. Visitor industry data include the historical visitor trends to the State and each of the Islands. Projections of future visitor activity are discussed. The existing and future visitor plant inventory are also discussed for each of the Islands.

2.1 VISITOR INDUSTRY

2.1.1 Overview

The economy of the State of Hawaii is heavily dependent on its visitor industry. As a result, the State's economy is sensitive to economic developments at major visitor-generating origins such as the U.S. Mainland and Japan. Significant increases in visitors from both the U.S. Mainland and Japan occurred during the late 1980s when total visitors to the State reached a peak of 6,971,180 in 1990. U.S. Mainland visitors decreased for the third consecutive year in 1993 when eastbound visitors also decreased. The decline in Hawaii's visitor industry has been attributed in part to economic conditions in both Japan and the U.S. Mainland, particularly California, and the increasing competition from alternative resort destinations in Mexico, the Caribbean, Asia and Oceania.

An analyses of Hawaii's visitor trends over the past 23 years suggests that the tourist industry is reaching a state of relative maturity and that the high growth rates of visitors experienced during the 1970s and late 1980s will not be repeated. This means that average annual increases will be more moderate in the future and probably more in line with growth in the population, income and gross national product in the visitor-generating areas. At the same time, the growth in Hawaii's visitor arrivals will be responsive to the cyclical nature of the economies in the visitor-generating areas and increasing competition from alternative resort destinations.

The mission of the Department of Business, Economic Development and Tourism (DBEDT) is planning the development, enhancement and promotion of a quality visitor industry which contributes to meeting the economic, social and environmental needs of Hawaii's people by developing new visitor markets and market segments while continuing to support Hawaii's established base visitor markets. The potential

for increased visitor arrivals from new and expanded markets such as Hong Kong, Singapore, Korea, Taiwan, China and several European countries as DBEDT continues the marketing of Hawaii as a desirable resort destination for visitors from these locations.

2.1.2 Visitor Trends-Statewide

Historical visitor trends for the State of Hawaii and westbound visitors to Hawaii, Kauai and Maui Counties are presented in Table 2-1 and graphically illustrated on Figure 2 for the State and Figure 3 for the Neighbor Islands. The number of visitors to the State has steadily increased at an average annual rate of 7.2 percent from 1,746,970 visitors in 1970, reaching a peak year of 6,971,180 visitors in 1990. The annual percentage increase in visitors was greater from 1970 to 1980, averaging 8.5 percent, than from 1980 to 1990, averaging 5.9 percent. Westbound visitors from the U.S. Mainland and Canada increased at an average annual rate of 8.7 percent from 1970 to 1980 and 4.5 percent from 1980 to 1990. Westbound visitors consistently accounted for over 75 percent of total visitors up until 1987 when westbound visitors accounted for only 73 of total visitors.

Visitors to Hawaii reached an all-time high in 1990 with 6,971,180 total visitors, a 5 percent increase over 6,641,820 visitors in 1989. Westbound visitors in 1990 increased a slight 0.3 percent while eastbound visitors increased 16.3 percent.

Overall visitors to Hawaii decreased from 6,971,180 in 1990 to 6,873,890 in 1991, an overall decline of 1.4 percent. Overall visitors decreased again by 5.2 percent in 1992 to 6,513,880 total visitors and decreased again by 6.1 percent in 1993 based on a total of 6,115,300 visitors.

Westbound visitors declined from 4,719,730 in 1990 to 4,584,460 in 1991, an overall decrease of 2.9 percent and decreased again by 13.2 percent to 3,980,120 visitors in 1992. Westbound visitors decreased again by 5.7 percent in 1993 based on a total of 3,754,570 visitors.

Eastbound visitors continued to increase from 2,251,450 visitors in 1990 to 2,289,430 visitors in 1991, an overall increase of 1.7 percent, and increased again to 2,533,760 visitors in 1992, an overall increase of 10.7 percent. However, eastbound visitors decreased in 1993 by 6.8 percent to a total of 2,360,730 visitors.

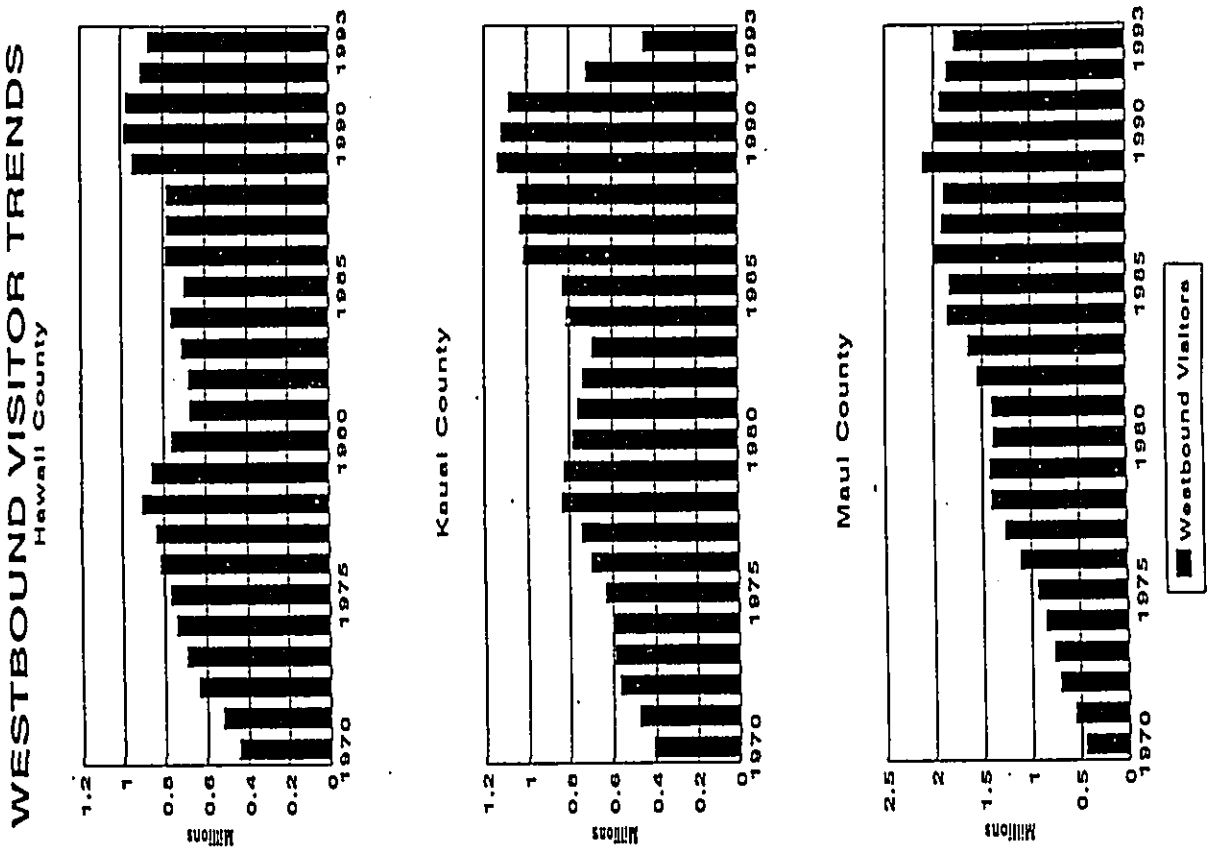
Table 2-1

VISITOR TRENDS
State of Hawaii
1970-1993

Year	Overnight and Longer Visitors	Westbound Visitors	Other Visitors	Westbound Hawaii County	Westbound Kauai County	Westbound Maui County
1970	1,746,970	1,326,135	420,835	445,401	410,075	447,985
1971	1,818,944	1,430,325	388,619	522,166	472,663	554,799
1972	2,244,377	1,782,737	461,640	637,562	565,386	710,050
1973	2,630,952	2,067,861	563,091	694,170	590,475	766,791
1974	2,786,489	2,184,620	601,869	742,839	601,703	852,204
1975	2,829,105	2,207,417	621,688	769,779	632,821	931,863
1976	3,220,151	2,551,601	688,550	816,514	699,275.	1,110,726
1977	3,433,667	2,763,312	670,355	839,008	740,501	1,257,142
1978	3,670,309	3,030,999	639,310	908,983	837,712	1,403,054
1979	3,960,531	3,139,455	821,076	860,940	825,366	1,419,773
1980	3,934,504	3,046,132	888,372	761,103	781,409	1,378,189
1981	3,934,623	2,974,791	959,832	672,683	757,811	1,389,892
1982	4,242,925	3,278,525	964,400	678,170	733,295	1,550,080
1983	4,368,105	3,396,115	971,990	712,380	692,940	1,645,720
1984	4,855,580	3,721,380	1,134,200	760,940	814,590	1,854,690
1985	4,884,110	3,708,610	1,175,500	697,380	832,580	1,831,110
1986	5,606,980	4,256,390	1,350,590	786,930	1,014,650	2,001,870
1987	5,799,830	4,204,010	1,595,820	782,550	1,032,840	1,908,780
1988	6,142,420	4,264,730	1,877,690	782,360	1,043,710	1,884,050
1989	6,641,820	4,705,320	1,936,500	946,540	1,138,230	2,113,100
1990	6,971,180	4,719,730	2,251,450	982,900	1,118,930	1,995,160
1991	6,873,890	4,584,460	2,289,430	975,610	1,085,290	1,925,460
1992	6,513,880	3,980,120	2,533,760	909,490	714,880	1,859,680
1993[1]	6,115,300	3,754,570	2,360,730	873,150	444,840	1,785,600

1. Preliminary

Source: Hawaii Visitors Bureau



Source: Hawaii Visitors Bureau

FIGURE 3

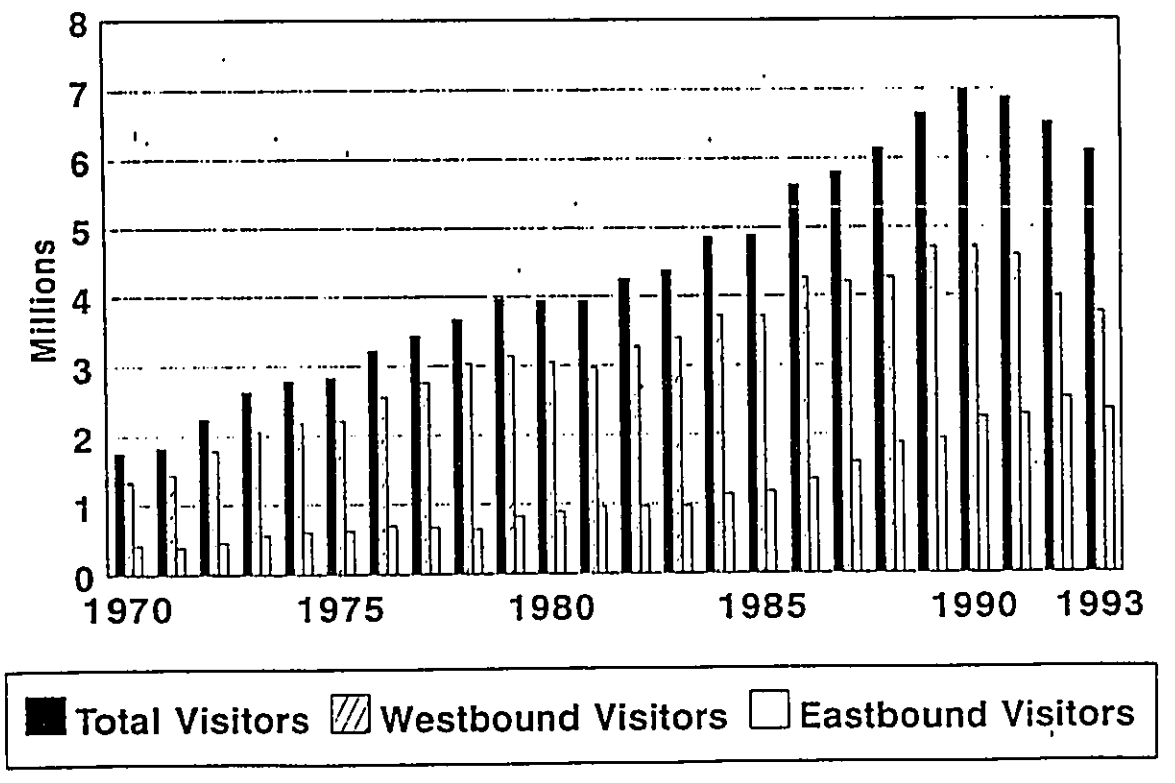


FIGURE 2

2.1.2.1 Visitor Trends--Neighbor Islands

Westbound and eastbound visitor trends to the Neighbor Islands have been compiled since 1990 by the Hawaii Visitors Bureau. These trends are presented in Table 2-2 and graphically illustrated on Figure 4.

Total visitors to Hawaii County decreased by 5 percent from a total of 1,170,830 in 1990 to 1,112,400 in 1993 as shown in Table 2-2. Westbound visitors decreased by 11.2 percent from 982,900 visitors in 1990 to 873,150 visitors in 1993. Eastbound visitors increased by 27 percent from 187,930 visitors in 1990 to 239,250 visitors in 1993.

Total visitors to Kauai County decreased by 56 percent from a total of 1,286,360 in 1990 to 572,410 visitors in 1993 as shown in Table 2-2. This significant decrease is directly attributed to the effects of Hurricane Iniki which struck the Island in September 1992. Prior to Hurricane Iniki, visitor trends to Kauai in 1990 and 1991 indicated a decrease of 3 percent in westbound visitors from 1,118,930 visitors in 1990 to 1,085,290 visitors in 1991 and an increase of 8.9 percent in eastbound visitors from 167,430 visitors in 1990 to 182,330 visitors in 1991.

Total visitors to Maui decreased by 5.7 percent from a total of 2,345, 060 in 1990 to 2,212,490 in 1993 as shown in Table 2-2. Westbound visitors decreased by 10.9 percent from 1,954,770 visitors in 1990 to 1,741,460 visitors in 1993. Eastbound visitors increased by 21 percent from 390,290 visitors in 1990 to 473,210 visitors in 1992 and decreased by less than one percent in 1993.

Total visitors to Molokai decreased by 13 percent from 103,630 visitors in 1990 to 90,580 visitors in 1993 as shown in Table 2-2. Westbound visitors decreased by 12.6 percent from 95,130 visitors in 1990 to 83,100 visitors in 1993 while eastbound visitors decreased by 12.0 percent from 8,500 visitors in 1990 to 7,480 visitors in 1993.

Total visitors to Lanai increased by 55 percent from 45,930 visitors in 1990 to 71,160 visitors in 1993 as shown in Table 2-2. Westbound visitors increased by 53.2 percent from 41,760 visitors in 1990 to 63,960 visitors in 1993 while eastbound visitors increased by 72.7 percent from 4,170 visitors in 1990 to 7,200 visitors in 1993.

2.1.3 Visitor Projections

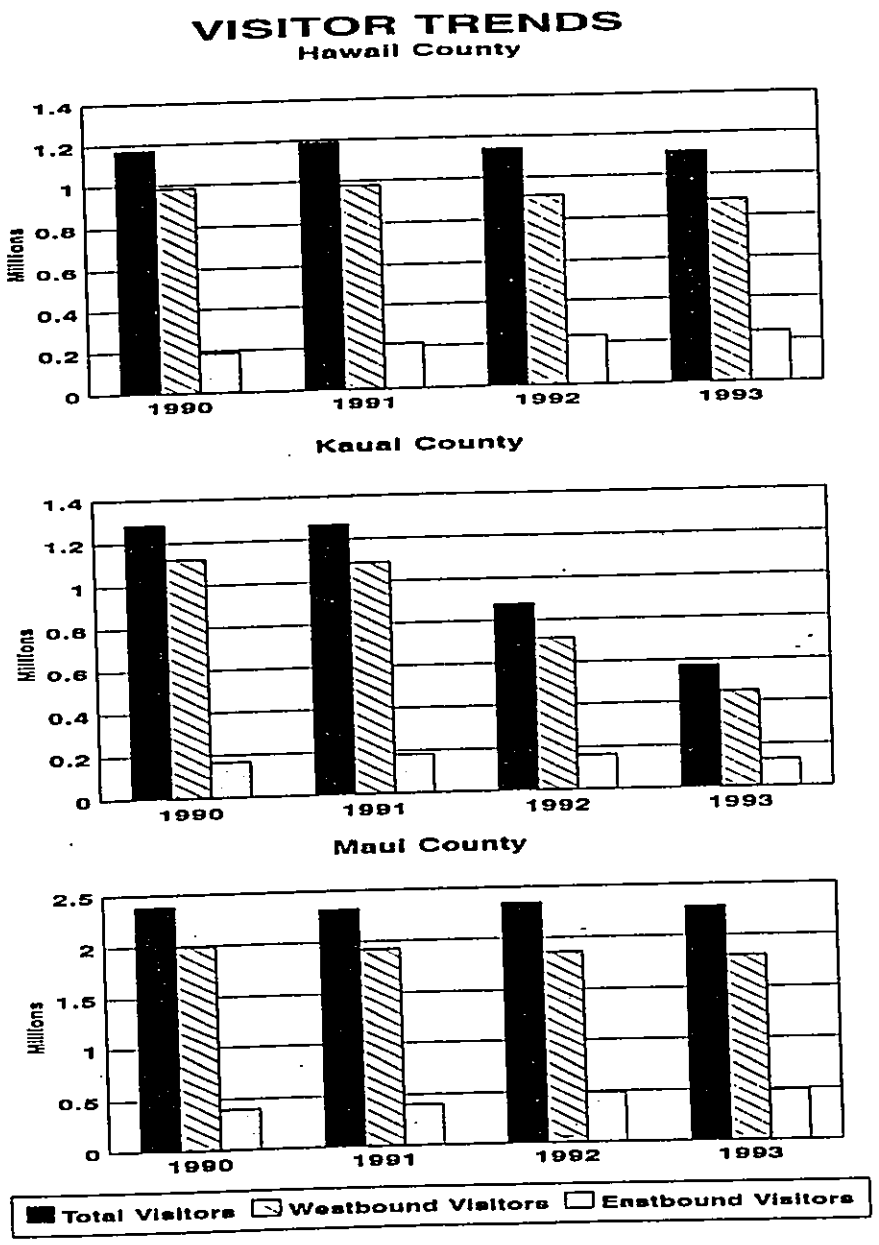
The most recent visitor industry projections prepared by the State of Hawaii, Department of Business, Economic Development and Tourism, in their *Population and Economic Projections for the State of Hawaii to 2010 (Series M-K)* are presented on

Table 2-2

VISITOR TRENDS BY ISLAND
1990-1993

Year	Westbound Visitors	Eastbound Visitors	Total
	Oahu		
1990	3,171,630	2,179,310	5,350,940
1991	2,899,170	2,149,380	5,048,550
1992	2,534,440	2,349,830	4,884,270
1993	2,373,150	2,150,930	4,524,080
	Hawaii		
1990	982,900	187,930	1,170,830
1991	975,610	213,020	1,188,630
1992	909,490	232,850	1,142,340
1993	873,150	239,250	1,112,400
	Kauai		
1990	1,118,930	167,430	1,286,360
1991	1,085,290	182,330	1,267,620
1992	714,880	162,180	877,060
1993	444,840	127,570	572,410
	Maui		
1990	1,954,770	390,290	2,345,060
1991	1,881,830	390,410	2,272,240
1992	1,812,200	473,210	2,285,410
1993	1,741,460	471,030	2,212,490
	Molokai		
1990	95,130	8,500	103,630
1991	87,750	8,870	96,620
1992	102,570	13,870	116,440
1993	83,100	7,480	90,580
	Lanai		
1990	41,760	4,170	45,930
1991	53,540	7,270	60,810
1992	71,300	8,720	80,020
1993	63,960	7,200	71,160

Source: Hawaii Visitors Bureau



Source: Hawaii Visitors Bureau

FIGURE 4

Table 2-3. The M-K Series, prepared in 1988, projected Statewide visitor arrivals to increase by an average annual rate of 3.5 percent through 1995 from a total of 6,521,00 visitors in 1990 to 7,746,000 visitor arrivals by 1995. Between 1995 and 2000 visitor arrivals were projected to increase by an average annual rate of 3.0 percent to a projected 8,979,000 Statewide visitor arrivals by 2000. Beyond 2000, the projected average annual rate of increase slowed to 2.5 percent with an estimated 11,494,000 Statewide visitor arrivals in 2010.

Statewide visitor arrivals exceeded the M-K Series projections by an estimated 450,000 visitors in 1990 with total arrivals of 6,971,180 visitors. Since 1990 visitor arrivals decreased by an estimated 13 percent to a total of 6,115,300 visitor arrivals in 1993. The State has not updated the 1988 M-K Series to reflect the impacts the decrease in visitor arrivals in 1991, 1992 and 1993 would have on the State's official long-range projections.

In the absence of any official update of the M-K Series projections, Aries Consultants Ltd. (Aries) prepared projections of visitor arrivals in order to update the aviation forecast activity for the State. These projections were based on historical visitor trends provided by the Hawaii Visitors Bureau. Visitor trend data from 1970 through 1992 were used to develop a least squares trend extrapolation of visitors through 2020. This analytical technique projects the historical fit of classical growth curves to future years. The assumption is made that the same factors that have affected visitor arrivals in the past will continue to effect visitor arrivals in the future. While this is a rather broad assumption, the technique provides a reliable benchmark for comparing the results of other analyses.

These projections were compared with recent unpublished Statewide visitor arrivals prepared by the Department of Transportation, Statewide Transportation Planning Office and the City and County of Honolulu Planning Department. In addition, unpublished visitor arrival updates were provided by the Hawaiian Electric Company, Inc. for review and the assumptions were reviewed with several government agencies. A comparison of the projected visitor arrivals expressed as average annual percentage increases are as follows:

	Visitors 2000	Annual Percent	Visitors 2010	Annual Percent	Visitors 2020	Annual Percent
1988 M-K Series	8,979,000	3.3	11,494,000	2.5	n.a.	n.a.
1994 City and County of Honolulu	8,358,000	1.8	11,276,000	3.0	14,279,000	2.4
Hawaiian Electric	8,676,000	2.2	13,409,000	4.4	n.a.	n.a.
1994 Aries Consultants Ltd.	8,528,000	2.0	10,855,000	2.4	13,183,000	2.0

n.a. = not available

Table 2-3

VISITOR PROJECTIONS
State of Hawaii
1985-2010

Visitors	Historical 1985	1990	1995	Forecast 2000	2005	2010
Visitor Arrivals	4,884,000	6,521,000	7,746,000	8,979,000	10,159,000	11,494,000
Non-Japanese	4,029,000	5,087,000	5,887,000	6,734,000	7,619,000	8,620,000
Japanese	855,000	1,435,000	1,859,000	2,245,000	2,540,000	2,874,000

Average Annual Increase (Percentage)	1985-1990	1990-1995	1995-2000	2000-2005	2005-2010
All Visitors	6.0	3.5	3.0	2.5	2.5
Non-Japanese	4.8	3.0	2.7	2.5	2.5
Japanese	10.9	5.3	3.9	2.5	2.5

Source: State of Hawaii, Department of Business, Economic Development and Tourism, Series M-K, November, 1988

The 1988 M-K Series projections increase by an average annual rate of 3.3 percent to reach the projected 8,979,000 visitor arrivals in 2000 from a base projection of 6,521,000 in 1990. Recent visitor projections prepared by the City and County of Honolulu show a more moderate rate of increase in visitor arrivals averaging 1.8 percent on an annual basis from 6,971,180 visitor arrivals in 1990 to 8,358,000 visitor arrivals by 2000. The Hawaiian Electric Company, Inc. forecasts were prepared for specific energy demand purposes and increase visitor arrivals by an average annual increase of 2.2 percent from 6,971,200 visitor arrivals in 1990 to a projected 8,676,000 visitor arrivals by 2000. The Aries Consultants Ltd. visitor arrival projections, prepared for the purposes of developing the updated aviation activity forecasts, estimate an average annual increase of 2.0 percent to a projected 8,528,000 visitor arrivals in 2000 from 6,513,880 visitor arrivals in 1992.

The projected Statewide visitor arrivals between 2000 and 2010 prepared for the 1988 M-K Series indicate an average annual increase of 2.5 percent to 11,494,000 visitor arrivals in 2010. The more recent projections of visitor arrivals, prepared by the City and County of Honolulu, average 3.0 annual increases between 2000 and 2010 and are slightly higher than those forecast for the M-K Series. The projections by the Hawaiian Electric Company, Inc. show an average annual increase of 4.4 percent from 8,676,000 visitor arrivals in 2000 to 13,409,000 visitor arrivals by 2010. Aries Consultants Ltd. forecast average annual increases of 2.4 percent to 10,855,000 visitor arrivals and these are slightly lower than the M-K Series forecasts.

Beyond 2010, the City and County of Honolulu forecast visitor arrivals to increase by 2.4 percent annually from 11,276,360 visitors in 2010 to 14,278,690 in 2020 compared to forecasts of average annual increases of 2.0 percent from 10,855,000 visitors in 2010 to 13,183,000 visitors in 2020 prepared by Aries Consultants Ltd. for purposes of updating the aviation demand forecasts.

The 1988 M-K Series forecasts were prepared during a period of high growth rate in visitor arrivals, particularly substantial increases in eastbound visitor arrivals in the late 1980s. More recent forecasts prepared by the City and County of Honolulu Planning Department escalate the annual increases in visitor arrivals in the shorter term to approximate the 2010 M-K Series visitor arrivals in 2010 (City and County of Honolulu projections of 11,276,360 visitor arrivals compared to M-K Series projections of 11,494,000 visitor arrivals). Visitor projections prepared by Aries Consultants Ltd. of 10,855,000 visitor arrivals in 2010 are more conservative than the other two forecasts.

The visitor projections prepared by Aries Consultants Ltd. for the aviation activity forecasts essentially delays the achievement of the M-K Series projections by three to five years and indicates visitor arrivals will increase at a slower rate of increase out to 2020.

2.1.4 Visitor Plant Inventory

The overall existing and planned-for visitor accommodation units for the State and Neighbor Islands were reviewed and compared to the 1988 M-K Series projections for the ability of units to accommodate the projected visitor arrivals. Information on the visitor plant inventory is obtained from the four counties and catalogued by the Hawaii Visitors Bureau.

The existing and planned-for visitor accommodation units for the State and each Neighbor Island, according to the 1993 Visitor Plant Inventory prepared by the Hawaii Visitors Bureau, are presented in Table 2-4. About 53 percent of the State's current visitor accommodation units are on Oahu; followed by Maui with 26 percent; Hawaii with 13 percent; Kauai with 7 percent; and Molokai and Lanai together with a total of one percent.

The 1993 State total of 70,542 visitor accommodation units includes only 4,631 visitor units on Kauai as an estimated 40 percent of the hotel and condominium units that closed following Hurricane Iniki in September 1992 had not reopened by the end of 1993.

Future approved units are also presented in Table 2-4 indicating Oahu has the highest number of approved units totaling 1,736 representing a 5 percent increase over the existing 37,032 units to a cumulative total of 38,768 units.

Kauai County has a total of 1,298 approved units representing a 17 percent increase over the pre-Iniki existing 7,778 units for a cumulative total of 9,076 units. The Big Island of Hawaii has a total of 880 approved units representing a 9 percent increase over the existing 9,490 units for a cumulative total of 10,370 units. The Island of Maui has a total of 215 approved units representing a one percent increase over the existing 18,443 units for a cumulative total of 18,658 units. There are no approved additional visitor units on the Islands of Molokai and Lanai.

Beyond the future approved visitor units, the overall State total planned-for units show an additional 18 percent increase from 77,818 units to a total of 92,177 units. Planned-for units on Oahu represent an increase of 18 percent from 38,768 units to

Table 2-4

VISITOR UNITS BY ISLAND

Island	Existing 1993	Future Approved	Ultimate
Oahu	37,032	1,736/38,768	7,086/45,854
Hawaii	9,490	880/10,370	6,455/16,825
Kauai	7,778[1] 4,631[2]	1,298/9,076	368/9,444
Maui	18,443	215/18,658	450/19,108
Molokai	579	579	579
Lanai	367	367	367
STATE TOTAL	70,542	4,129/77,818	14,359/92,177

1. Prior to Hurricane Iniki
2. 1993

Source: Hawaii Visitors Bureau

45,854; the Big Island with an increase of 62 percent from 10,370 units to 16,825 units; Kauai with an increase of 4 percent from 9,076 units to 9,444 units and the Island of Maui with 2 percent from 18,658 units to 19,108 units.

The existing 1993 visitor accommodation units were compared to forecasts in the 1988 M-K Series projections as follows:

	1993			1988 M-K Series Forecast	
		Future			
	Existing	Approved	Ultimate	1990	2010
1993 Visitor Plant Inventory	70,542	77,818	92,177	65,900	132,800

Although the development dates of an estimated 14,000 additional visitor units (for a total of 92,000 total visitor units) are not known, it appears that the 1988 M-K Series projection of 132,800 visitor accommodation units by 2010 may have been optimistic. It should be noted, however, that the Hawaii Visitors Bureau has a known 5 percent nonresponse rate to visitor plant properties, and based on total visitor arrivals and average lengths of stay, the existing visitor plant inventory for the State of 70,542 accommodation units may be understated by considerably more than 5 percent.

2.2 POPULATION AND EMPLOYMENT

2.2.1 Population

The historical and projected population numbers for the State and counties are presented in Table 2-5. Historically, the State's population as a whole has grown at an average annual increase of 1.9 percent from a 1970 population of 771,600 to a 1992 population of 1,159,600. The Statewide population increased at a greater average annual rate of 2.3 percent during the 1970s, from a 1970 population of 771,600 to a 1980 population of 968,500 than during the 1980s and early 1990s as the population increase slowed to an average annual rate of 1.5 percent. The average annual increase in population during the most recent five-year period has been 1.4 percent from a total population of 1,079,800 in 1988 to a population of 1,159,600 in 1992.

The most recent population projections prepared by the State of Hawaii, Department of Business, Economic Development and Tourism, in their *Population and Economic Projections for the State of Hawaii to 2010 (Series M-K)* are also presented in Table 2-5. The M-K Series, prepared in 1988, projected Statewide population to increase by an average annual rate of 1.5 percent through 1995 from a total population

Table 2-5

HISTORICAL AND PROJECTED POPULATION BY COUNTY
State of Hawaii
1970-2010

Year[1]	State Total	City and County of Honolulu	Hawaii	Kauai	Maui[2]
1970[3]	771,600	631,600	63,800	29,800	46,500
1971[3]	801,600	654,600	67,000	30,900	49,100
1972[3]	828,300	674,900	70,000	31,900	51,500
1973	851,600	691,400	73,900	32,900	53,400
1974	868,000	707,600	74,000	32,600	53,800
1975	886,200	718,600	77,400	33,400	56,800
1976	904,200	728,300	80,700	34,900	60,300
1977	918,300	737,000	82,800	35,500	63,000
1978	931,600	742,600	85,900	36,800	66,200
1979	953,300	756,000	89,400	38,100	69,700
1980	968,500	764,600	92,900	39,400	71,600
1981	978,200	767,600	96,100	40,500	74,000
1982	993,800	776,100	98,800	41,800	77,100
1983	1,012,700	789,100	100,800	42,800	80,100
1984	1,027,900	797,800	103,500	43,600	83,000
1985	1,039,700	804,300	105,900	44,400	85,100
1986	1,051,800	810,400	108,400	45,600	87,400
1987	1,067,900	818,400	111,700	47,200	90,500
1988	1,079,800	824,100	113,400	48,500	93,800
1989	1,094,600	831,300	116,600	79,800	96,800
1990	1,113,900	839,400	121,500	51,600	101,400
1991	1,136,600	852,000	126,400	53,300	105,000
1992	1,159,600	864,800	130,500	55,300	109,000
Projected[4]					
1990	1,137,200	861,600	124,600	54,100	96,800
1995	1,225,200	910,400	142,500	61,100	111,200
2000	1,285,100	932,800	160,400	68,200	123,900
2005	1,350,800	961,100	180,800	75,500	133,400
2010	1,435,500	999,500	206,100	84,600	145,200

1. As of July 1. The resident population is defined as the number of persons whose usual place of residence is in an area, regardless of physical location on the census or estimate date. It includes armed forces stationed or homeported in an area but excludes persons of local origin attending school or in military service outside the area.
2. Includes Kalawao County
3. Estimated
4. State of Hawaii, Department of Business, Economic Development and Tourism, Series M-K, November 1988

Source: State of Hawaii, Department of Business, Economic Development and Tourism

of 1,051,500 in 1985 to a population of 1,225,200 by 1995. Between 1995 and 2000 total population was projected to increase by an average annual rate of 1.0 percent to a projected population of 1,285,100 by 2000. Beyond 2000, the projected average annual rate of increase of slightly over 1.0 percent to a projected Statewide population of 1,435,500 by 2010.

The 1988 M-K Series projections of 1990 Statewide population of 1,137,200 exceeded the actual population of 1,113,900 in that year by an estimated 23,000 people. However, Maui County exceeded the 1990 projection of 96,800 population by 4,600 people. Since then the Statewide population increased 2.0 in 1991 and an additional 2.0 percent in 1992. The State has not updated the 1988 M-K Series to reflect the impacts the 1990 U.S. Census data would have on the State's official long-range projections.

2.2.2 Employment

The historical and forecast employment numbers for the State and counties are presented in Table 2-6. Historically, the State's employment as a whole has grown at an average annual increase of 2.9 percent from a 1970 employment base of 305,650 to a 1992 employment of 572,000. Statewide employment increased at a greater average annual rate of 3.2 percent during the 1970s, from a 1970 employment base of 305,650 to a 1980 employment of 418,000 than during the 1980s and early 1990s as the population increase slowed to an average annual rate of 2.6 percent. The average annual increase in population during the most recent five-year period has been 2.6 percent from total employment of 502,000 in 1988 to 572,000 in 1992.

The most recent employment projections prepared by the State of Hawaii, Department of Business, Economic Development and Tourism, in their *Population and Economic Projections for the State of Hawaii to 2010 (Series M-K)* are also presented on Table 2-6. The M-K Series, prepared in 1988, projected Statewide employment to increase by an average annual rate of 1.9 percent through 1995 from a total employment projection of 516,700 in 1990 to total employment of 568,600 by 1995. Between 1995 and 2000 total employment was projected to increase by an average annual rate of 1.5 percent to a projected employment base of 614,000 by 2000. Beyond 2000, the projected average annual rate of increase of slightly over 1.0 percent to a projected Statewide employment number of 686,300 by 2010.

The 1988 M-K Series projections of 1990 Statewide employment of 516,700 was exceeded by actual employment of 572,000 in that year by an estimated 55,000 people. Since 1990 Statewide employment increased 4.0 in 1991 and an additional 9.0 percent in 1992.

Table 2-6

CIVILIAN EMPLOYMENT BY COUNTY
State of Hawaii
1970-2010

Year	State Total	City and County of Honolulu	Hawaii	Kauai	Maui
1970	305,650	n.a.	n.a.	n.a.	n.a.
1971	313,450	n.a.	n.a	n.a	n.a.
1972	324,050	n.a.	n.a.	n.a	n.a.
1973	338,350	n.a.	n.a.	n.a.	n.a.
1974	345,350	278,400	29,900	13,750	23,350
1975	351,100	280,050	31,150	14,800	25,050
1976	370,000	293,750	32,900	16,100	27,250
1977	388,000	306,500	34,350	17,350	29,800
1978	388,000	305,950	33,950	17,200	30,900
1979	395,000	311,050	34,350	17,500	32,100
1980	418,000	322,800	40,850	18,700	35,650
1981	427,000	328,500	42,150	18,900	37,450
1982	430,000	328,600	42,700	19,150	39,550
1983	442,000	336,550	44,050	20,000	41,450
1984	445,000	338,050	44,900	19,800	42,250
1985	452,000	341,150	46,150	20,550	44,150
1986	468,000	352,500	47,500	22,000	46,050
1987	494,000	369,850	50,950	23,850	49,350
1988	502,000	373,500	52,200	25,350	51,000
1989	511,000	375,950	54,700	26,800	53,550
1990	524,000	382,300	58,800	26,950	55,950
1991	546,000	394,200	63,500	28,850	59,450
1992	572,000	408,200	68,100	30,900	65,800
Projected					
1990	516,700	417,100	50,800	25,300	49,400
1995	568,600	450,200	59,300	29,800	57,800
2000	614,000	476,300	68,200	34,200	66,000
2005	649,500	494,100	78,300	38,100	71,400
2010	686,300	511,200	89,800	42,500	77,200

n.a. = not available

Source: State of Hawaii, Department of Business, Economic Development and Tourism

SECTION 3.0

FORECAST METHODOLOGY AND ASSUMPTIONS

Several scenarios of passenger demand forecasts were prepared based on information presented in Section 2.0, historical aviation activity and discussions with representatives of the State Department of Transportation, Airports Division, and others, as described in this section.

The State's official long-range economic projections have not been updated. Therefore, the development of passenger demand forecasts included several analytical techniques combined with judgmental processes based on knowledge of the overall State system of airports and the aviation industry as a whole. Sensitivity analyses were used to compare the forecasting results to other interim economic projections being prepared by several agencies for their own planning purposes. In addition, other considerations and assumptions were used in developing a high and low range of passenger demand forecasts, and these are discussed in this section.

Eastbound passengers have accounted for an increasing percent of the total passengers to Hawaii in recent years. The forecast of continuing economic growth in several Pacific Rim countries such as Korea, Taiwan, Hong Kong, Singapore and China, in addition to Japan, could provide increasing eastbound visitors to the State of Hawaii. It is assumed that, with the potential of new and expanded visitor markets in the Pacific, eastbound passengers will continue to increase as a percent of the total passengers.

The base year for the aviation demand forecasts was considered to be 1992 as it was the most recent year for which complete data were available while the forecasts were being prepared. In addition, more recent 1993 data from the State Department of Transportation, Airports Division, were, after review, considered to be inconsistent probably reflecting the effects of Hurricane Iniki on decreased visitors to Kauai and possible increased visitors to other islands. A reduction in westbound visitors continued for the third consecutive year while eastbound passengers began to decrease in 1993 reflecting the effects of troubled economies in two of Hawaii's major tourist-generating areas, namely, California and Japan.

3.1 FORECAST METHODOLOGY

The "high range" of passenger demand forecasts were prepared based on a time series, or least squares extrapolation, of total Statewide passengers and total passengers for each county based on total 1980 passengers through 1992 passengers. This type of linear regression is used to find a straight line that best fits historical data and

forecasts a straight line into the future. The assumption is made that the same factors that have influenced the historical data will continue to influence future data. Although this is a rather broad assumption, the linear regression provides a reliable benchmark for comparing results of other analyses.

The "low range" of passenger demand forecasts were prepared based on a least squares extrapolation of historical visitors to the State from 1970 through 1992 and forecasting visitors on a trend line through 2020. The total visitors forecast as a result of the linear regression were then used to develop a mathematical regression to develop the total number of passengers for the State and the individual counties.

3.2 FORECAST ASSUMPTIONS

The following general assumptions were used in the preparation of the passenger demand forecasts:

- The State of Hawaii will continue to promote the maintenance and development of a quality visitor industry.
- Visitor facilities, including hotels, shops, restaurants and the infrastructure (e.g., housing, roads and utilities) will be available to support an increasing number of visitors to the Islands.
- The population will increase at a sufficient rate to support employment requirements for the visitor industry and the State.
- No policies that would constrain aviation growth will be imposed on any of the State airports.
- Adequate facilities and services will be made provided as needed at all of the State's airports.

Discussions were held with representatives of the Office of State Planning; the State Department of Business, Economic Development and Tourism; State Department of Transportation, Statewide Transportation Planning; the Federal Aviation Administration; U.S. Immigration and Naturalization Service; Hawaii Visitors Bureau and the individual County Planning and Economic Development Departments. In addition, discussions were held with representatives of the Airlines Committee of Hawaii and airlines providing overseas and interisland service to the State. Two scenarios for future Statewide aviation activity were prepared using two basic assumptions as a result of these discussions.

Scenario One: All international flights are assumed to be through Honolulu International Airport.

Scenario Two: Some international flights are assumed to operate non-stop to Kahului and Keahole-Kona International Airports during the forecast period.

The following assumptions were used for developing the aviation passenger demand forecasts for both scenarios:

- Total overseas passengers are forecast to account for an increasing share of the total Statewide passengers through the forecast period from 43 percent in 1992 to 48 percent by 2020.

- Even though Mainland passengers are forecast to continue to dominate the total overseas passengers to the State, overseas westbound passengers are assumed to account for a decreasing percent of the total overseas passengers through the forecast period from 63 percent in 1992 to 55 percent in 2020.

- Total International passengers are forecast to account for an increasing share of the total overseas passengers through the forecast period from 37 percent in 1992 to 45 percent by 2020. Canadian passengers on scheduled flights from Vancouver and Toronto are processed through the International Arrivals Terminal at Honolulu International Airport, and this is expected to continue in the future. Therefore, these passengers, which account for about 2 percent of the overseas passengers, have been included in the "international" passenger category for the forecasts. Passengers from Canada to the Neighbor Islands and on charter flights to Honolulu International Airport are included in the "Mainland" totals in the forecasts, as they are precleared in Canada and this is expected to continue in the future.

- Eastbound passengers have increased as a percent of the total overseas passengers from approximately 26 percent in 1980 to 35 percent of the total overseas passengers in 1992. Eastbound (Central and South Pacific) passengers are assumed to increase from 35 percent of the total overseas passengers in 1992 to approximately 43 percent of the total overseas passengers in 2020.

- The Honolulu International Airport share of total Mainland westbound passengers is forecast to continue to decline from 82 percent of the total in 1992 to 72 percent in 2020 with increased direct flights to the Neighbor Islands.

- In 1991 the percentages of total Mainland overseas passengers going directly to the Neighbor Islands were 12 percent to Kahului, 3 percent to Keahole-Kona International and 2 percent to Lihue. This distribution is expected to change over time to 16 percent for Kahului, 8 percent for Keahole-Kona International and 4 percent for Lihue by 2020 with increased direct flights to the Neighbor Islands.

- Direct overseas passenger service to Lihue Airport was suspended in 1993 following Hurricane Iniki and it is assumed that overseas service will be reinstated during the forecast period.

- Direct overseas passenger service to Hilo International Airport was suspended in 1987, and it is assumed that overseas service will not be reinstated at Hilo International Airport during the forecast period.

- Scheduled commuter service to the Waimea-Kohala Airport was suspended in 1993 and it is assumed service will be reinstated during the forecast period. (Currently only limited essential air service is provided.)

- Overseas flights at Honolulu International Airport will be primarily by B-747/DC-10/L1011/MD-11/B-777/B-767/B-757 type aircraft in the future. At the Neighbor Island airports, overseas flights are expected to be by DC-10/L1011/MD-11/B-777/B-757 type aircraft in the future. Interisland air carrier operations are expected to be primarily by B-737, DC-9, MD-80 type aircraft in the future with some DC-10/L1011 type aircraft operations. Interisland commuter/air taxi operations are expected to be by large turboprop (ATR-42, Saab 340, DHC-8,DHC-6) and smaller (Cessna 402, Britten-Norman and Piper 31) type aircraft in the future.

- All cargo aircraft operations are included in the forecasts of air carrier and commuter/air taxi operations according to the type of aircraft being used (e.g., B-747, DC-10, DC-8 and B-737 versus Cessna 208 and Shorts 330).

Discussions were held with representatives of the Airlines Committee of Hawaii on potential changes in overseas and interisland airline service during the forecast period as well as the types of aircraft to be used. In addition, information on future military aircraft operations, by airport, has been provided by U.S. CINCPAC.

Table 3-1

COMPARISON OF ALTERNATIVE PASSENGER FORECASTS
1992-2020

	Actual 1992	2000	2005	2010	2015	2020
1) HIGH Passenger Forecast Based On 1980-1992 Trend Extrapolation						
Statewide	33,472,976	44,526,000	50,315,000	56,105,000	61,840,000	67,684,000
Honolulu	21,290,144	28,410,000	32,063,000	35,717,000	39,370,000	43,023,000
Hawaii	3,749,761	4,926,000	5,659,000	6,392,000	7,125,000	7,859,000
Kauai	2,428,134	3,387,000	3,725,000	4,062,000	4,400,000	4,738,000
Maui	6,004,926	7,803,000	8,868,000	9,934,000	10,999,000	12,064,000
2) LOW Passenger Forecast Based On Visitor Trend Extrapolation 1970-1992						
Statewide	33,472,976	40,109,000	45,117,000	50,129,000	55,143,000	60,153,000
Honolulu	21,290,144	25,367,000	28,829,000	32,291,000	35,753,000	39,216,000
Hawaii	3,749,761	4,499,000	4,871,000	5,248,000	5,627,000	6,000,000
Kauai	2,428,134	2,916,000	3,162,000	3,408,000	3,654,000	3,900,000
Maui	6,004,926	7,327,000	8,255,000	9,182,000	10,109,000	11,037,000
3) FAA Hawaii Forecasts[1]						
Statewide	31,251,244	45,626,600		68,031,400		
Honolulu	20,739,272	30,412,000		45,276,000		
Hawaii[2]	3,442,508	5,592,000		9,599,000		
Kauai	2,175,282	3,532,000		4,958,000		
Maui[2]	4,894,182	6,090,600		8,198,400		

3.3 COMPARISON OF ALTERNATIVE PASSENGER FORECASTS

Table 3-1 presents the estimates of the "high" and "low" range of passenger forecasts developed based on the foregoing analyses. For comparison purposes, passenger demand forecasts prepared by the Federal Aviation Administration in their November 1993 *FAA Aviation Forecasts-Hawaii* report on aviation activity measures for the State of Hawaii (FAA Hub Forecasts) are presented as well as the 1989 passenger forecasts developed based on the State's 1988 M-K Series projections. The alternative passenger forecasts are graphically illustrated for Statewide passengers on Figure 5 and for Honolulu International Airport and Hawaii, Kauai and Maui counties on Figures 6, 7, 8 and 9 respectively and are discussed below.

3.3.1 1994 High Passenger Demand Forecasts

The high range of the total Statewide passengers (enplaned and deplaned) forecast passengers to increase from 33,472,976 in 1992 to 67,684,000 by 2020, an average annual increase of 2.5 percent and overall increase of 102 percent.

Honolulu International Airport passengers are forecast to parallel increases in Statewide passengers increasing from 21,290,144 in 1992 to 43,023,000 by 2020, an average annual increase of 2.5 percent and overall increase of 102 percent.

Hawaii County passengers are forecast to increase from 3,749,761 in 1992 to 7,859,000 by 2020, an average annual increase of 2.7 percent and overall increase of 110 percent. Kauai County passengers are forecast to increase from 2,428,134 in 1992 to 4,738,000 by 2020, an average annual increase of 2.4 percent and overall increase of 95 percent while Maui County passengers are forecast to increase from 6,004,926 in 1992 to 12,064,000 by 2020, an average annual increase of 2.5 percent and overall increase of 101 percent.

3.3.2 1994 Low Passenger Demand Forecasts

The low range of total Statewide passengers (enplaned and deplaned) forecast passengers to increase from 33,472,976 in 1992 to 60,153,000 by 2020, an average annual increase of 2.1 percent and overall increase of 80 percent.

Honolulu International Airport passengers are forecast to increase from 21,290,144 in 1992 to 39,216,000 by 2020, an average annual increase of 2.2 percent and overall increase of 84 percent.

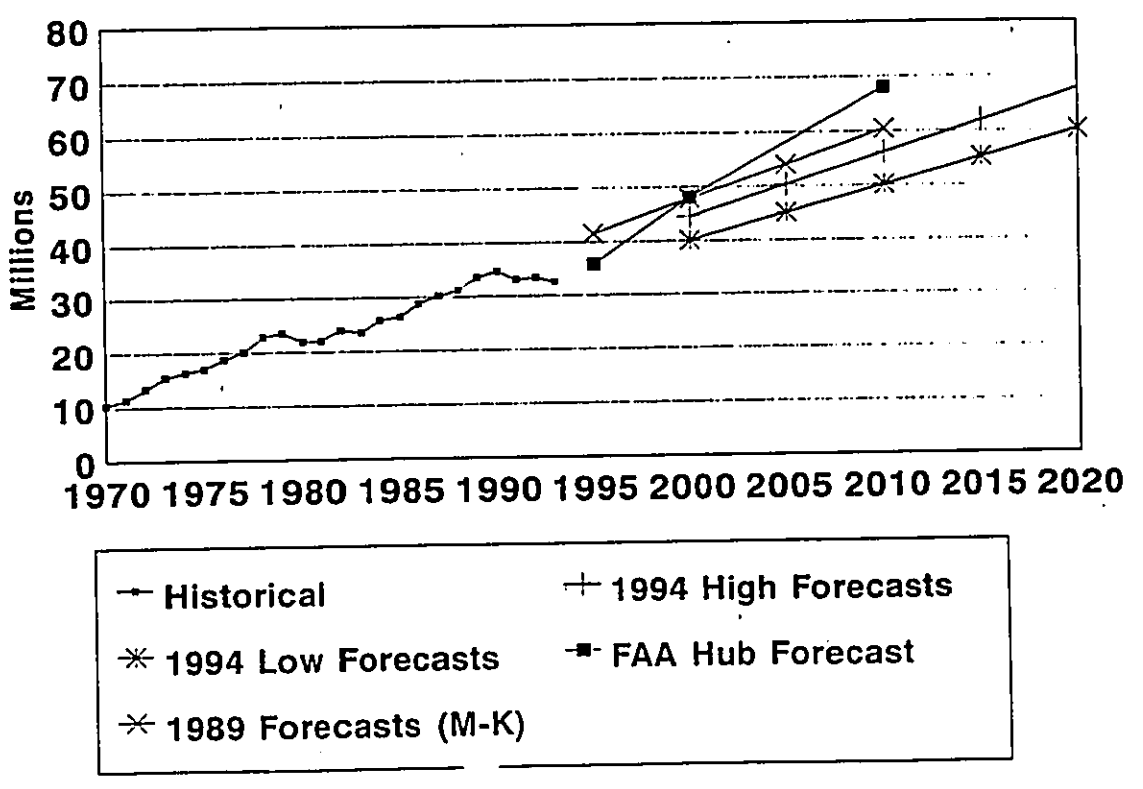
Table 3-1 -- continued

COMPARISON OF ALTERNATIVE PASSENGER FORECASTS 1992-2020

4) 1989 Passenger Forecast	Actual 1989	2000	2005	2010	2015	2020
Based on M-K Series						
Statewide	31,293,617	47,886,000	53,982,000	60,437,000		
Honolulu	20,153,307	29,515,000	32,987,000	36,956,000		
Hawaii	3,047,213	5,651,000	6,687,000	7,493,000		
Kauai	2,766,384	4,126,000	4,632,000	5,081,000		
Maui	5,325,713	8,594,000	9,676,000	10,907,000		

1. Based on Fiscal Year activity
2. Hilo and Keahole-Kona International Airports only
3. Kahului and Molokai Airports only

FIGURE 5

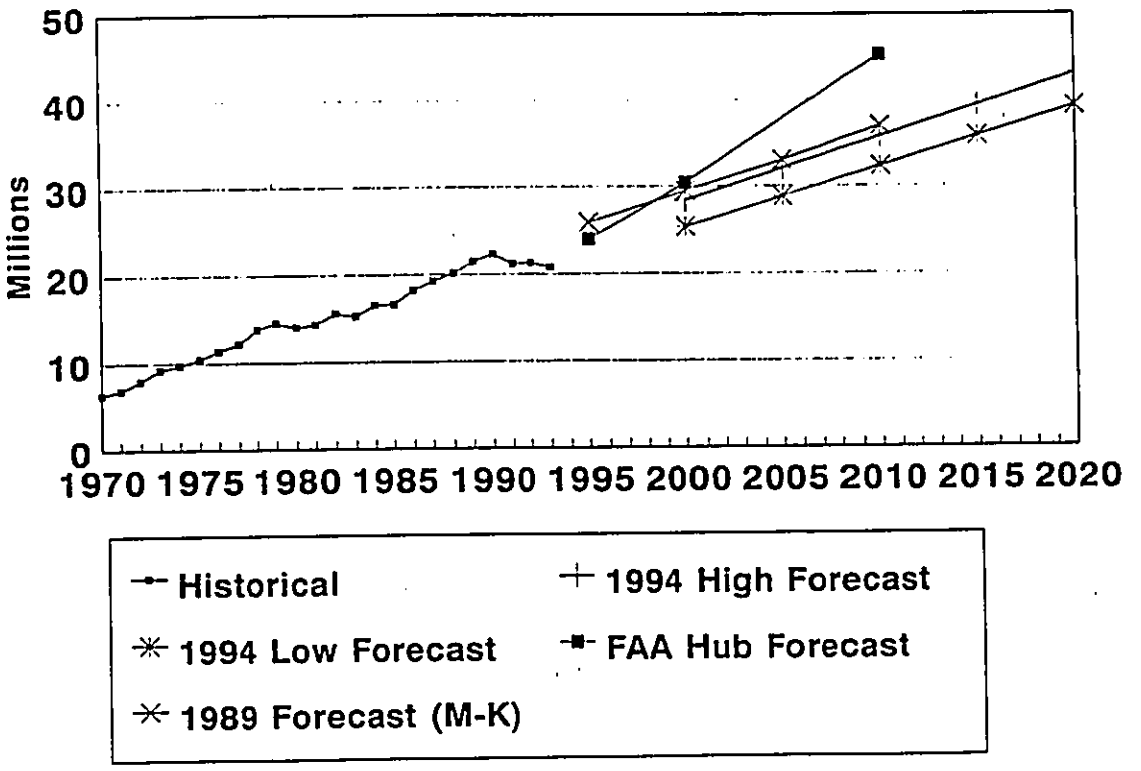


Source: Aries Consultants Ltd.

HONOLULU INTERNATIONAL AIRPORT

Historical and Forecast Passengers

FIGURE 6

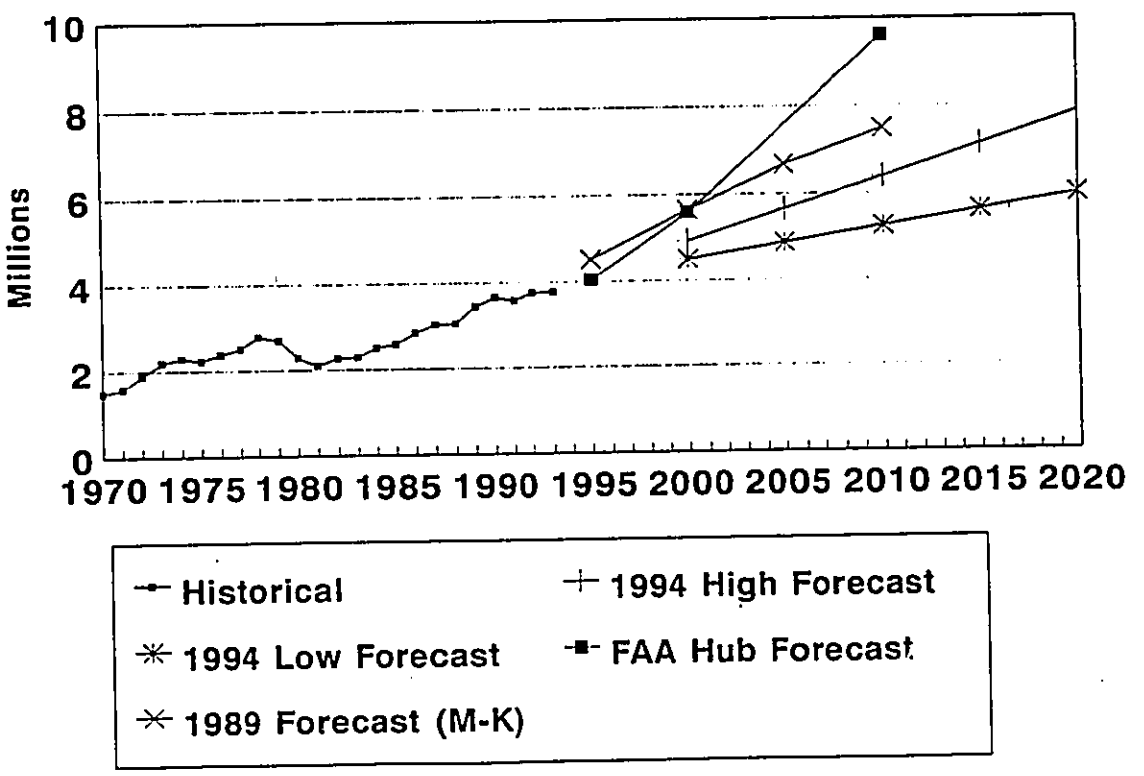


Source: Aries Consultants Ltd.

HAWAII COUNTY PASSENGERS

Historical and Forecast

FIGURE 7

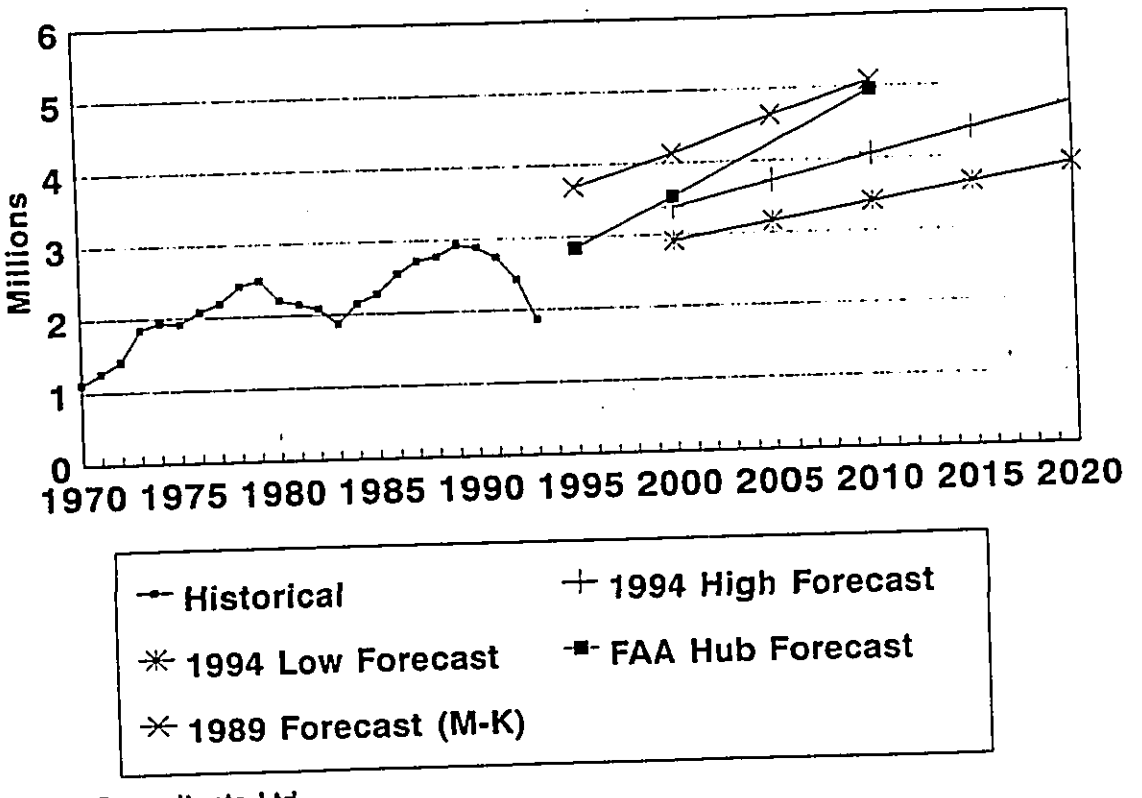


Source: Aries Consultants Ltd.

FIGURE 8

KAUAI COUNTY PASSENGERS

Historical and Forecast

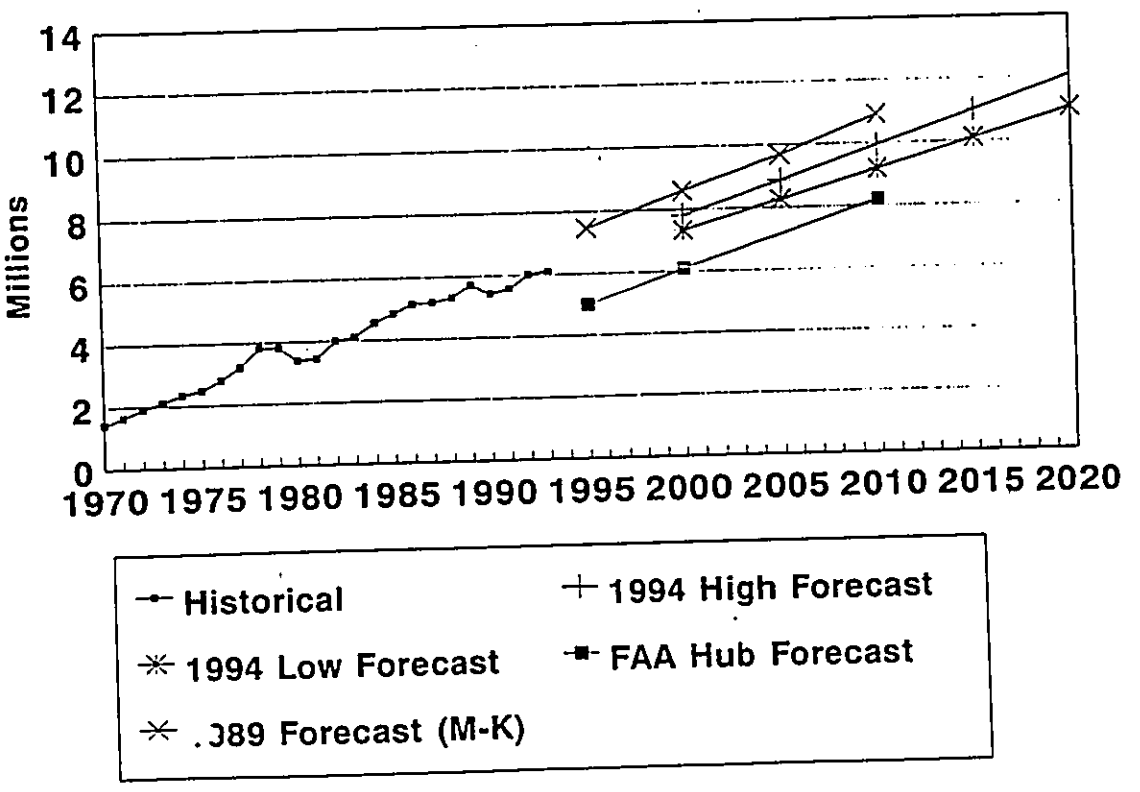


Source: Aries Consultants Ltd.

FIGURE 9

MAUI COUNTY PASSENGERS

Historical and Forecast



Source: Aries Consultants Ltd.

Hawaii County passengers are forecast to increase from 3,749,761 in 1992 to 6,000,000 by 2020, an average annual increase of 1.7 percent and overall increase of 60 percent. Kauai County passengers are forecast to increase from 2,428,134 in 1992 to 3,900,000 by 2020, an average annual increase of 1.7 percent and overall increase of 61 percent while Maui County passengers are forecast to increase from 6,004,926 in 1992 to 11,037,000 by 2020, an average annual increase of 2.2 percent and overall increase of 84 percent.

Based on comments received on the initial draft, some minor revisions were made to the low range projections. These revisions increased the forecast Hawaii County passengers from 5,638,000 to 6,000,000 in 2020 and the Statewide passengers from 59,791,000 to 60,153,000 in 2020 as noted above.

3.3.3 Federal Aviation Administration Aviation Forecasts-Hawaii

Aviation demand forecasts are prepared by the Forecast and Statistics Branch of the Federal Aviation Administration (FAA) to meet the budgeting and planning needs of the various offices and services of the FAA. FAA published *FAA Aviation Forecasts-Hawaii* in November 1993, which included passenger demand forecasts for Honolulu, Hilo and Keahole-Kona International and Lihue, Kahului and Molokai Airports only. (These six airports accounted for 98.3 percent of the total Statewide passengers in 1992.) The FAA follows an overall top-down methodology for forecasting which relies heavily on FAA aviation activity forecasts on the national level. In addition, the 1988 M-K Series projections for socioeconomic elements, including the visitor industry, were used in preparing the FAA forecasts through 2010.

Total Statewide passengers (enplaned and deplaned) forecast passengers to increase from 31,251,244 in fiscal year 1992 to 68,031,400 by 2010, an average annual increase of 4.4 percent and overall increase of 118 percent.

Honolulu International Airport passengers are forecast to increase from 20,739,272 in fiscal year 1992 to 45,276,000 by 2010, an average annual increase of 4.4 percent and overall increase of 118 percent.

Hawaii County passengers for Hilo and Keahole-Kona International Airports only are forecast to increase from 3,442,508 in fiscal year 1992 to 9,599,0000 by 2020, an average annual increase of 5.9 percent and overall increase of 179 percent. Kauai County (Lihue Airport) passengers are forecast to increase from 2,175,282 in fiscal year 1992 to 8,198,000 by 2020, an average annual increase of 2.9 percent and overall increase of 68 percent. Maui County passengers for Kahului and Molokai Airports are forecast to increase from 4,894,182 in fiscal year 1992 to 1,198,400 by 2020, an average annual increase of 2.9 percent and overall increase of 68 percent.

3.3.4 1989 Aviation Demand Forecasts Update

The *Aviation Demand Forecasts Update, Statewide Airport System Plan* (1989 Forecasts) was prepared for the Statewide Airport System Plan and included passenger forecasts for the State of Hawaii and the individual counties and airports through 2010. The forecasts were based on projections prepared by the (then) Department of Business and Economic Development in their *Population and Economic Projections for the State of Hawaii to 2010* (Series M-K). Statewide passengers (enplaned and deplaned) were forecast to increase from 31,293,617 in 1989 to 60,437,000 by 2010, an average annual increase of 3.7 percent and overall increase of 93 percent.

Honolulu International Airport passengers were forecast to increase from 20,153,307 in 1989 to 36,956,000 by 2010, an average annual increase of 3.4 percent and overall increase of 83 percent.

Hawaii County passengers were forecast to increase from 3,047,213 in 1989 to 7,493,000 by 2010, an average annual increase of 5.1 percent and overall increase of 146 percent. Kauai County passengers were forecast to increase from 2,766,384 in 1989 to 5,081,000 by 2010, an average annual increase of 3.4 percent and overall increase of 84 percent while Maui County passengers were forecast to increase from 5,325,713 in 1989 to 10,907,000 by 2010, an average annual increase of 4.1 percent and overall increase of 105 percent.

3.3.5 Summary

The forecasting methodologies, assumptions and alternative forecasts were presented and discussed with Airports Division representatives and others before proceeding with the more detailed analyses for the individual airports.

The 1988 M-K Series projections have not been updated to reflect the simultaneous decrease in U.S. Mainland and Japanese visitors in the early 1990s. The FAA Hub Forecasts were prepared based on an overall top-down methodology which relies on FAA aviation activity forecasts on the national level, and at the same time used the 1988 M-K Series projections for socioeconomic data. The 1989 *Aviation Demand Forecasts Update* also relied heavily on the 1988 M-K Series projections which are considered out of date.

Based on the discussions and reviews as noted above, a "high" and "low" range of passenger forecasts were prepared and are presented for the State and individual airports for Scenario One in Section 4.0.

The "low" range of passenger forecasts was selected to prepare the updated aviation demand forecasts including forecasts for air cargo and air mail, aircraft operations and based aircraft. The aviation demand forecasts for the individual airports are presented in Section 5.0.

The passenger activity forecasts that would occur under Scenario Two with some international service to Keahole-Kona International and Kahului Airports, as well as Honolulu International Airport, are presented and discussed in Section 6.0.

SECTION 4.0

SCENARIO ONE - PASSENGER DEMAND FORECASTS

The overall high and low ranges of passenger demand forecasts prepared for the State and counties have been categorized by Mainland, International and Interisland and assigned to individual airports receiving passenger service during the forecast period based on the assumptions presented earlier.

The results of those analyses are initially presented for the high range and low range of passenger forecasts for Scenario One whereby all international flights are assumed to continue to be through Honolulu International Airport. (The high range and low range of forecasts for Scenario Two whereby some international flights are assumed to operate nonstop to Kahului and Keahole-Kona International Airports are presented later in Section 6.0.)

The high and low range of passenger demand forecasts are presented in tabular format and discussed in the following paragraphs.

4.1 Scenario One - Passenger Demand Forecasts

Tables 4-1 and 4-2 present the results of the high and low range of passenger demand forecasts for the State and individual airports for Scenario One.

4.1.1 Statewide

Statewide passengers are forecast to increase from 33,472,976 in 1992 to 67,684,000 by 2020, an annual average growth rate of 2.5 percent and an overall increase of 102 percent based on the high range of passenger growth. For the low range of growth, Statewide passengers are forecast to increase from 33,472,976 in 1992 to 60,153,000 by 2020, an annual average growth rate of 2.1 percent and an overall increase of 80 percent for the low range of passenger growth.

4.1.2 Honolulu International Airport

Honolulu International Airport passengers are forecast to increase from 21,290,144 in 1992 to 43,023,000 by 2020, an annual average growth rate of 2.5 percent and an overall increase of 102 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 21,290,144 in 1992 to 39,216,000 by 2020, an annual average growth rate of 2.2 percent and an overall increase of 84 percent.

Table 4-1

HIGH PASSENGER FORECASTS
(By County and Airport)
Scenario One (55 Percent Mainland/45 Percent International)
1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
STATEWIDE						
Overseas						
- Mainland	8,990,529	12,342,000	13,812,000	15,227,000	16,567,000	17,868,000
- International	5,345,579	7,249,000	8,830,000	10,581,000	12,498,000	14,620,000
Subtotal	14,336,108	19,591,000	22,642,000	25,808,000	29,065,000	32,488,000
Interisland	19,136,868	24,935,000	27,673,000	30,297,000	32,775,000	35,196,000
Total	33,472,976	44,526,000	50,315,000	56,105,000	61,840,000	67,684,000
HONOLULU INTERNATIONAL						
Overseas						
- Mainland	7,323,468	9,874,000	10,773,000	11,573,000	12,259,000	12,865,000
- International	5,345,579	7,249,000	8,830,000	10,581,000	12,498,000	14,620,000
Subtotal	12,669,047	17,123,000	19,603,000	22,154,000	24,757,000	27,485,000
Interisland	8,621,097	11,287,000	12,460,000	13,563,000	14,613,000	15,538,000
Total	21,290,144	28,410,000	32,063,000	35,717,000	39,370,000	43,023,000

Table 4-1 -- continued

HIGH PASSENGER FORECASTS, Scenario One (55 Percent Mainland/45 Percent International) 1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
HILO INTERNATIONAL						
Overseas						
- Mainland	167	0	0	0	0	0
Interisland	1,573,647	1,995,000	2,207,000	2,397,000	2,565,000	2,711,000
Subtotal	1,573,814	1,995,000	2,207,000	2,397,000	2,565,000	2,711,000
KEAHOLE-KONA INTERNATIONAL						
Overseas						
- Mainland	278,995	494,000	690,000	914,000	1,160,000	1,429,000
Interisland	1,882,941	2,417,000	2,739,000	3,055,000	3,371,000	3,687,000
Subtotal	2,161,936	2,911,000	3,429,000	3,969,000	4,531,000	5,116,000
WAIMEA-KOHALA	14,011	20,000	23,000	26,000	29,000	32,000
HAWAII TOTAL	3,749,761	4,926,000	5,659,000	6,392,000	7,125,000	7,859,000
LIHUE						
Overseas						
- Mainland	106,102	247,000	345,000	457,000	580,000	715,000
Interisland	2,276,165	3,086,000	3,320,000	3,540,000	3,750,000	3,947,000
Subtotal	2,382,267	3,333,000	3,665,000	3,997,000	4,330,000	4,662,000
PRINCEVILLE	45,867	54,000	60,000	65,000	70,000	76,000
KAUAI TOTAL	2,428,134	3,387,000	3,725,000	4,062,000	4,400,000	4,738,000

Table 4-1 -- continued

HIGH PASSENGER FORECASTS, Scenario One (55 Percent Mainland/45 Percent International) 1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
KAHULUI						
Overseas						
- Mainland	1,281,797	1,728,000	2,002,000	2,284,000	2,568,000	2,859,000
Interisland	3,900,713	4,983,000	5,668,000	6,358,000	7,056,000	7,758,000
Subtotal	5,182,510	6,711,000	7,670,000	8,642,000	9,624,000	10,617,000
KAPALUA	333,514	453,000	488,000	517,000	550,000	567,000
HANA	22,213	23,000	27,000	30,000	33,000	36,000
MOLOKAI	314,489	421,000	461,000	497,000	517,000	543,000
KALAUPAPA	13,528	16,000	18,000	20,000	22,000	24,000
LANAI	138,672	179,000	204,000	228,000	253,000	277,000
MAUI TOTAL	6,004,926	7,803,000	8,868,000	9,934,000	10,999,000	12,064,000

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

Table 4-2

LOW PASSENGER FORECASTS
(By County and Airport)
Scenario One (55 Percent Mainland/45 Percent International)
1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
STATEWIDE						
Overseas						
- Mainland	8,990,529	11,118,000	12,385,000	13,605,000	14,773,000	15,880,000
- International	5,345,579	6,530,000	7,918,000	9,454,000	11,144,000	12,993,000
Subtotal	14,336,108	17,648,000	20,303,000	23,059,000	25,917,000	28,873,000
Interisland	19,136,868	22,461,000	24,814,000	27,070,000	29,226,000	31,280,000
Total	33,472,976	40,109,000	45,117,000	50,129,000	55,143,000	60,153,000
HONOLULU INTERNATIONAL						
Overseas						
- Mainland	7,323,468	8,894,000	9,660,000	10,340,000	10,932,000	11,434,000
- International	5,345,579	6,530,000	7,918,000	9,454,000	11,144,000	12,993,000
Subtotal	12,669,047	15,424,000	17,578,000	19,794,000	22,076,000	24,427,000
Interisland	8,621,097	9,943,000	11,251,000	12,497,000	13,677,000	14,789,000
Total	21,290,144	25,367,000	28,829,000	32,291,000	35,753,000	39,216,000

Table 4-2 -- continued

LOW PASSENGER FORECASTS, Scenario One (55 Percent Mainland/45 Percent International) 1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
HILO INTERNATIONAL						
Overseas						
- Mainland	167	0	0	0	0	0
Interisland	1,573,647	1,827,000	1,929,000	2,026,000	2,116,000	2,196,000
Subtotal	1,573,814	1,827,000	1,929,000	2,026,000	2,116,000	2,196,000
KEAHOLE-KONA INTERNATIONAL						
Overseas						
- Mainland	278,995	445,000	619,000	816,000	1,034,000	1,270,000
Interisland	1,882,941	2,209,000	2,304,000	2,385,000	2,455,000	2,510,000
Subtotal	2,161,936	2,654,000	2,923,000	3,201,000	3,489,000	3,780,000
WAIMEA-KOHALA	14,011	18,000	19,000	21,000	22,000	24,000
HAWAII TOTAL	3,749,761	4,499,000	4,871,000	5,248,000	5,627,000	6,000,000
LIHUE						
Overseas						
- Mainland	106,102	222,000	310,000	408,000	517,000	635,000
Interisland	2,276,165	2,647,000	2,801,000	2,945,000	3,079,000	3,203,000
Subtotal	2,382,267	2,869,000	3,111,000	3,353,000	3,596,000	3,838,000
PRINCEVILLE	45,867	47,000	51,000	55,000	58,000	62,000
KAUAI TOTAL	2,428,134	2,916,000	3,162,000	3,408,000	3,654,000	3,900,000

Table 4-2 -- continued

LOW PASSENGER FORECASTS, Scenario One (55 Percent Mainland/45 Percent International) 1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
KAHULUI						
Overseas						
- Mainland	1,281,797	1,557,000	1,796,000	2,041,000	2,290,000	2,541,000
Interisland	3,900,713	4,744,000	5,344,000	5,947,000	6,556,000	7,171,000
Subtotal	5,182,510	6,301,000	7,140,000	7,988,000	8,846,000	9,712,000
KAPALUA	333,514	425,000	454,000	478,000	505,000	519,000
HANA	22,213	22,000	25,000	28,000	30,000	33,000
MOLOKAI	314,489	396,000	429,000	459,000	475,000	497,000
KALAUPAPA	13,528	15,000	17,000	18,000	20,000	22,000
LANAI	138,672	168,000	190,000	211,000	233,000	254,000
MAUI TOTAL	6,004,926	7,327,000	8,255,000	9,182,000	10,109,000	11,037,000

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

4.1.3 Hawaii County

Hilo International Airport passengers are forecast to increase from 1,573,814 in 1992 to 2,711,000 by 2020, an annual average growth rate of 2.0 percent and an overall increase of 72 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 1,573,814 in 1992 to 2,196,000 by 2020, an annual average growth rate of 1.2 percent and an overall increase of 40 percent.

Keahole-Kona International Airport passengers are forecast to increase from 2,161,936 in 1992 to 5,116,000 by 2020, an annual average growth rate of 3.1 percent and an overall increase of 137 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 2,161,936 in 1992 to 3,780,000 by 2020, an annual average growth rate of 2.0 percent and an overall increase of 75 percent.

Waimea-Kohala Airport passengers are forecast to increase from 14,011 in 1992 to 32,000 by 2020, an annual average growth rate of 3.0 percent and an overall increase of 128 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 14,011 in 1992 to 24,000 by 2020, an annual average growth rate of 1.9 percent and an overall increase of 71 percent.

4.1.4 Kauai County

Lihue Airport passengers are forecast to increase from 2,382,267 in 1992 to 4,662,000 by 2020, an annual average growth rate of 2.4 percent and an overall increase of 96 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 2,382,267 in 1992 to 3,838,000 by 2020, an annual average growth rate of 1.7 percent and an overall increase of 61 percent.

Princeville Airport passengers are forecast to increase from 45,867 in 1992 to 76,000 by 2020, an annual average growth rate of 1.8 percent and an overall increase of 66 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 45,867 in 1992 to 62,000 by 2020, an annual average growth rate of 1.1 percent and an overall increase of 35 percent.

4.1.5 Maui County

Kahului Airport passengers are forecast to increase from 5,182,510 in 1992 to 10,617,000 by 2020, an annual average growth rate of 2.6 percent and an overall increase of 105 percent based on the high range of passenger growth. For the low

range of growth, passengers are forecast to increase from 5,182,510 in 1992 to 9,712,000 by 2020, an annual average growth rate of 2.3 percent and an overall increase of 87 percent.

Kapalua Airport passengers are forecast to increase from 333,514 in 1992 to 567,000 by 2020, an annual average growth rate of 1.9 percent and an overall increase of 70 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 333,514 in 1992 to 519,000 by 2020, an annual average growth rate of 1.6 percent and an overall increase of 56 percent.

Hana Airport passengers are forecast to increase from 22,213 in 1992 to 36,000 by 2020, an annual average growth rate of 1.7 percent and an overall increase of 62 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 22,213 in 1992 to 33,000 by 2020, an annual average growth rate of 1.4 percent and an overall increase of 49 percent.

Molokai Airport passengers are forecast to increase from 314,489 in 1992 to 543,000 by 2020, an annual average growth rate of 2.0 percent and an overall increase of 73 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 314,489 in 1992 to 497,000 by 2020, an annual average growth rate of 1.6 percent and an overall increase of 58 percent.

Kalaupapa Airport passengers are forecast to increase from 13,528 in 1992 to 24,000 by 2020, an annual average growth rate of 2.1 percent and an overall increase of 77 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 13,528 in 1992 to 22,000 by 2020, an annual average growth rate of 1.8 percent and an overall increase of 63 percent.

Lanai Airport passengers are forecast to increase from 138,672 in 1992 to 277,000 by 2020, an annual average growth rate of 2.5 percent and an overall increase of 100 percent based on the high range of passenger growth. For the low range of growth, passengers are forecast to increase from 138,672 in 1992 to 254,000 by 2020, an annual average growth rate of 2.2 percent and an overall increase of 83 percent.

4.2 Average Annual Percentage Increases in Five-year Increments

Table 4-3 presents a comparison of the high and low range of passenger demand forecasts expressed in average annual percentage increases.

Based on the high passenger demand forecasts, Honolulu International Airport passengers are forecast to increase at a gradually decreasing rate from an average annual 3.7 percent increase from 1992 to 2000 to an average annual 2.5 percent

Table 4-3

PASSENGER FORECASTS
Scenario One (55 Percent Mainland/45 Percent International)
Average Annual Percentage Increase
1992-2020

	County			
Table 4-1 High	Honolulu	Hawaii	Kauai	Maui
1992 - 2000	3.7	3.5	4.2	3.3
2001 - 2005	2.5	2.8	1.9	2.6
2006 - 2010	2.2	2.5	1.7	2.3
2011 - 2015	2.0	2.2	1.6	2.1
2016 - 2020	1.8	2.0	1.5	1.9
Table 4-2 Low				
1992 - 2000	2.2	2.3	2.3	2.5
2001 - 2005	2.6	1.6	1.6	2.4
2006 - 2010	2.3	1.5	1.5	2.2
2011 - 2015	2.1	1.4	1.4	1.9
2016 - 2020	1.9	1.3	1.3	1.8

Source: Aries Consultants Ltd.

increase from 2001 to 2005; to an average annual 1.8 percent increase from 2016 to 2020. Based on the low passenger demand forecasts, the rate of increase in passenger activity at Honolulu International is slightly higher, increasing at an average annual 2.2 percent increase from 1992 to 2000; 2.6 percent increase from 2001 to 2005 and gradually decreasing to an average annual 1.9 percent increase from 2016 to 2020.

It should be noted that the average annual growth rates from 1992 to 2000 presented in Table 4-3 for the high range of passenger forecasts are greater than the growth rates for the low passenger demand forecasts during the same period. The high passenger forecasts were based on significant increases in visitors during the 1980s and to a certain extent, continue to increase passenger demand at a faster growth rate through 2000 when the growth rate commences to slow. At the same time the slightly higher average annual percent increase difference from the high to the low passenger demand forecasts is directly related to the methodology used to arrive at the high and low forecast numbers. When expressed in terms of passengers, the actual difference is less than one percent of total passengers.

Hawaii County is forecast to increase at an average annual rate of 3.5 percent from 1992 to 2000, an average annual rate of 2.8 percent from 2001 to 2005 and gradually decrease to an average annual rate of 2.0 percent from 2016 to 2020 under the high passenger demand forecasts. Based on the low passenger demand forecasts, these rates of increase are forecast to decrease from an average annual rate of 1.6 percent from 2001 to 2005 down to 1.3 percent from 2016 to 2020.

Kauai County is forecast to increase at an average annual rate of 4.2 percent from 1992 to 2000, an average annual rate of 1.9 percent from 2001 to 2005 and gradually decrease to an average annual rate of 1.5 percent from 2016 to 2020 under the high passenger demand forecasts. Based on the low passenger demand forecasts, these rates of increase are forecast to decrease from an average annual rate of 1.6 percent from 2001 to 2005 down to 1.3 percent from 2016 to 2020.

Maui County is forecast to increase at an average annual rate of 3.3 percent from 1992 to 2000, an average annual rate of 2.6 percent from 2001 to 2005 and gradually decrease to an average annual rate of 1.9 percent from 2016 to 2020 under the high passenger demand forecasts. Based on the low passenger demand forecasts, these rates of increase are forecast to decrease from an average annual rate of 2.4 percent from 2001 to 2005 down to 1.8 percent from 2016 to 2020.

SECTION 5.0

AIRPORT AVIATION DEMAND FORECASTS

The aviation demand forecasts for the individual airports through 2020 are presented in this section. Updated forecasts have been prepared for aviation activity including passengers, volumes of air cargo and air mail, aircraft operations and based aircraft. These more detailed forecasts presented in this section are based on the "low" range of passenger growth as discussed in Sections 3.0 and 4.0. All international flights are assumed to continue to be through Honolulu International Airport in the forecasts presented in this section. The Statewide historical and forecast passenger volumes are illustrated on Figure 10.

5.1 CITY AND COUNTY OF HONOLULU

Passenger activity for the City and County of Honolulu is at the Honolulu International Airport.

5.1.1 Honolulu International Airport

The aviation demand forecasts for Honolulu International Airport are presented in Table 5-1. The historical and forecast passenger volumes are illustrated on Figure 11.

5.1.1.1 Passengers

Honolulu International Airport will remain the principal overseas airport in the State although the trend toward a decreasing role is expected to continue as nonstop and direct overseas flights to major Neighbor Island airports continue to increase. This scenario assumes that the Airport will continue as the only foreign port-of-entry for air travelers.

The total number of passengers (enplaned and deplaned) at Honolulu International Airport is estimated to increase from 21,290,144 in 1992 to 39,216,000 by 2020, an average annual growth rate of 2.2 percent and an overall increase of 84 percent over the 28 year forecast period. It is expected that a majority of Honolulu International Airport passengers will continue to be carried on overseas routes to and from the Mainland and Pacific areas.

Overseas mainland passengers are forecast to increase from 7,323,463 in 1992 to 11,434,000 by 2020, an average annual growth rate of 1.6 percent and an overall increase of 56 percent. International passengers are forecast to increase from

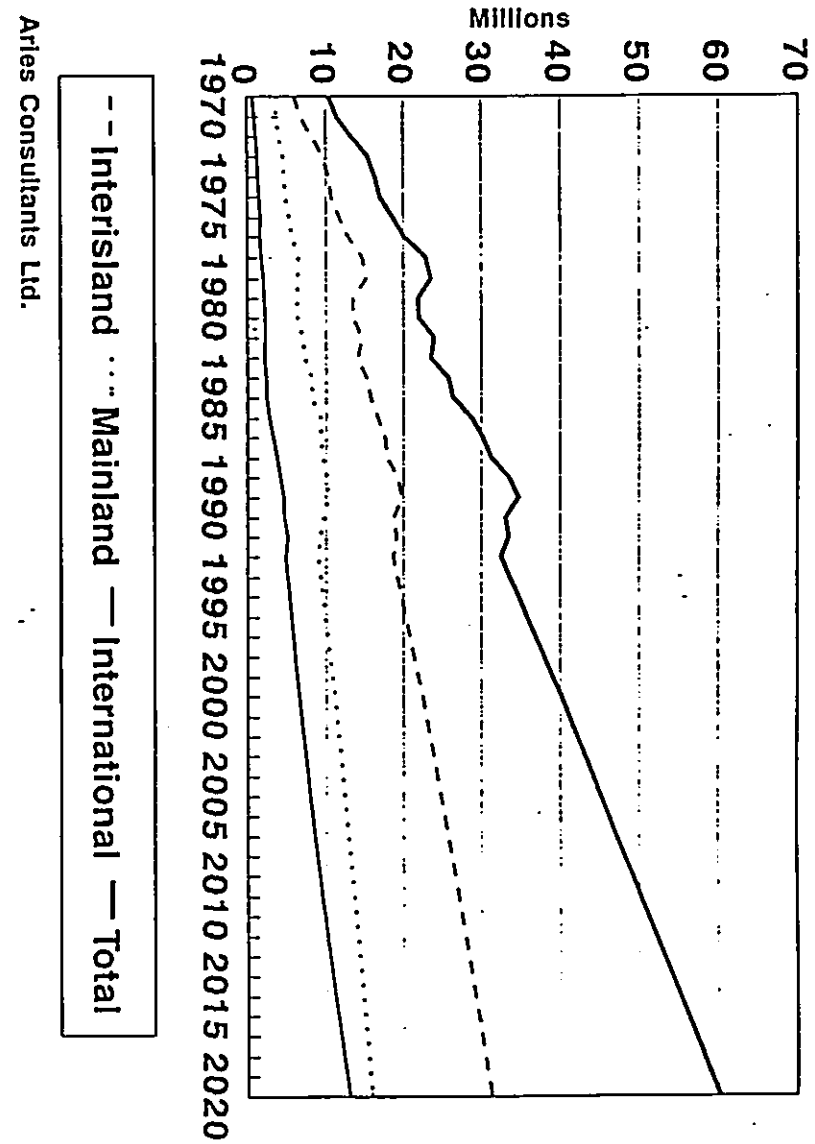


FIGURE 10

Source: Aries Consultants Ltd.

Table 5-1

AVIATION DEMAND FORECASTS
Honolulu International Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Overseas						
- Mainland	7,323,468	8,894,000	9,660,000	10,340,000	10,932,000	11,434,000
- International	5,345,579	6,530,000	7,918,000	9,454,000	11,144,000	12,993,000
Interisland	8,621,097	9,943,000	11,251,000	12,497,000	13,677,000	14,789,000
Total	21,290,144	25,367,000	28,829,000	32,291,000	35,753,000	39,216,000
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	354,013	442,000	497,000	558,000	620,000	681,000
Mail (tons)	65,427	78,000	88,000	99,000	110,000	121,000
Total	419,440	520,000	585,000	657,000	730,000	802,000
Aircraft Operations						
Air carrier	202,559	202,000	219,800	235,000	250,400	263,700
Commuter/air taxi	58,782	66,300	73,000	80,300	83,900	88,600
General aviation	113,623	103,000	107,000	112,000	118,000	130,000
Military	28,664	24,200	23,300	22,200	22,200	22,200
Total	403,628	395,500	423,100	449,500	474,500	504,500
Based Aircraft	238	252	264	277	288	302

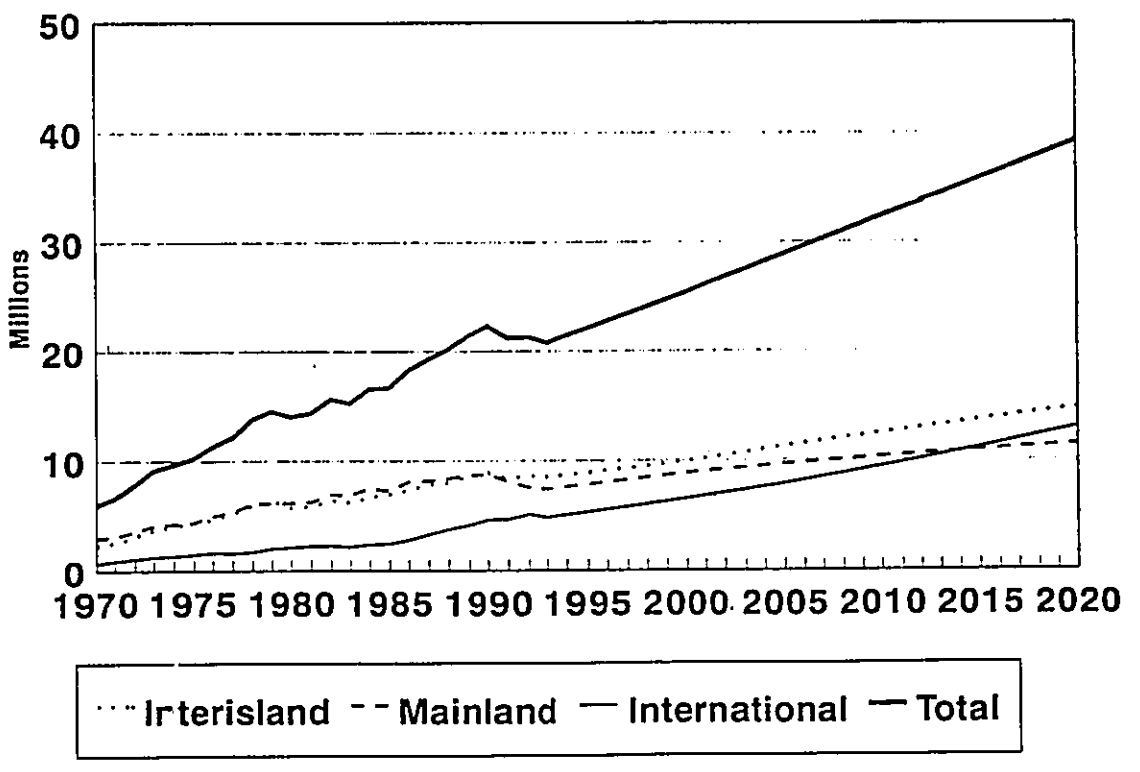
a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

FIGURE 11

HONOLULU INTERNATIONAL AIRPORT

Historical and Forecast Passengers



Source: Aries Consultants Ltd.

5,345,579 in 1992 to 12,993,000 by 2020, an average annual increase of 3.2 percent and an overall increase of 143 percent as illustrated on Figure 12.

Interisland passengers are forecast to increase from 8,621,007 in 1992 to 14,789,000 by 2020, an average annual increase of 1.9 percent and an overall increase of 72 percent. Interisland passengers are expected to account for a declining share of the total passengers at the Airport from 40 percent in 1992 to 38 percent in 2020.

5.1.1.2 Air Cargo and Air Mail

The combined air cargo and mail volume is forecast to increase from 419,000 tons in 1992 to 802,000 tons in 2020, an overall increase of 91 percent.

5.1.1.3 Aircraft Operations

Total aircraft operations are forecast to increase from 403,628 in 1992 to 504,500 operations by 2020, an overall increase of 25 percent.

The number of air carrier aircraft operations is forecast to increase from 202,559 operations in 1992 to 263,700 operations by 2020. About five percent of the air carrier operations are assumed to be by air cargo operations.

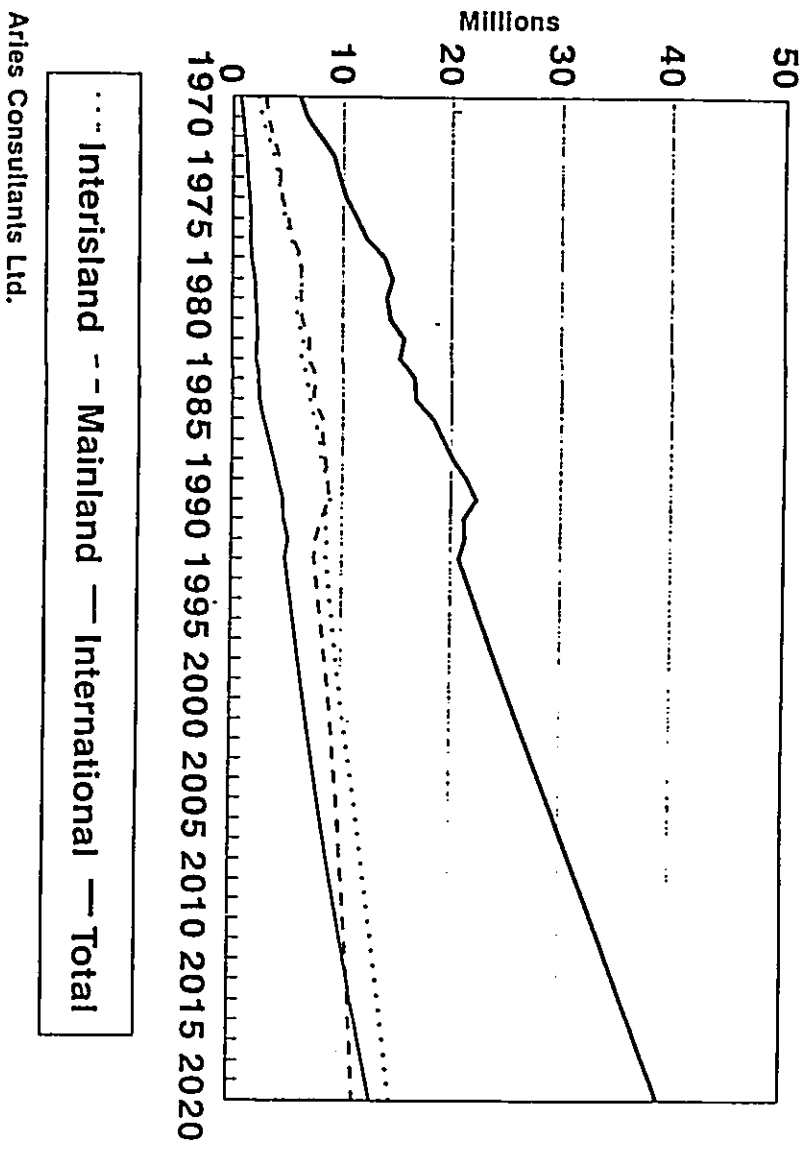
Commuter/air taxi operations are forecast to increase from 58,782 operations in 1992 to 88,600 operations in 2020. About 30 percent of the commuter/air taxi operations are assumed to be helicopter operations.

General aviation operations have been forecast to show only a modest increase from 113,623 operations in 1992 to 130,000 operations by 2020, assuming continuation of all the current general aviation activity at Honolulu International Airport. (However, the State is currently studying potential general aviation use of NAS Barbers Point which is scheduled to be closed. The effects of relocating some general aviation activity from Honolulu International Airport to Barbers Point (Ka-Lae-Loa) Airport are discussed later in Section 5.1.4).

Military aircraft operations are forecast to be between 22,000 and 24,000 operations annually throughout the forecast period.

Based Aircraft. The number of based aircraft is expected to increase from 238 aircraft in 1992 to 302 aircraft in 2020 assuming a continuation of current general aviation activity at the Airport.

FIGURE 11



Source: Aries Consultants Ltd.

5.1.2 Dillingham Airfield

The *Dillingham Airfield Master Plan and Part 150 Noise Compatibility Program* prepared for the State of Hawaii, Department of Transportation, Airports Division in August 1993 assumes the future role of Dillingham Airfield will remain essentially the same as at present since Dillingham is currently the only airport on Oahu used primarily for general aviation activities. However, this role may change when Naval Air Station Barbers Point becomes available for civilian use.

The aviation demand forecasts for Dillingham Airfield are presented in Table 5-2.

Aircraft Operations. Civil aviation aircraft operations, by powered aircraft and gliders, are expected to increase gradually from 97,278 operations in 1992 to 163,000 operations by 2020.

The glider and associated tow aircraft should be counted as air taxi operations according to FAA classifications. On this basis there would have been 60,786 air taxi operations and 31,586 general aviation operations in 1992.

Military aircraft operations are forecast to remain at approximately 5,000 operations annually throughout the forecast period.

Based Aircraft. The number of based aircraft are forecast to increase from 47 in 1992 to 68 by 2020. At present gliders account for about 50 percent of the based aircraft, but are expected to account for an increasing percentage of the total based aircraft in the future. Powered aircraft could account for a declining percentage of the based aircraft if Barbers Point (Ka-Lae-Loa) Airport becomes a more convenient airport for people to base their aircraft at and also a reliever airport for Honolulu International Airport.

5.1.3 Ford Island ALF

At this time it is not known how long Ford Island ALF will continue to be available for general aviation activity. For the purpose of these forecasts, it has been assumed that Ford Island will not be available for general aviation activity by the year 2000. Ford Island operations have been assumed to continue at the present level of 62,700 operations and be transferred to Barbers Point when Ford Island ceases to be available.

5.1.4 Barbers Point (Ka-Lae-Loa) Airport

The State is currently studying the potential use of Barbers Point Airport as a general aviation reliever airport for Honolulu International Airport.

Table 5-2

AVIATION DEMAND FORECASTS
Dillingham Airfield, Ford Island ALF and Barbers Point (Ka-Lae-Loa) Airport
1992-2020

AIRCRAFT OPERATIONS	Actual[a] 1992	2000	2005	2010	2015	2020
DILLINGHAM AIRFIELD						
Civil	92,372	104,000	118,000	132,000	147,000	163,000
Military	4,906	6,000	6,000	6,000	6,000	6,000
Subtotal	97,278	110,000	124,000	138,000	153,000	169,000
Based Aircraft	47	52	56	60	64	68
FORD ISLAND ALF						
Civil	62,744	-0-	-0-	-0-	-0-	-0-
(FOR ILLUSTRATIVE PURPOSE ONLY)						
BARBERS POINT (KA-LAE-LOA) AIRPORT						
Honolulu International	—	61,800	64,200	67,200	70,800	78,000
Dillingham Airfield	—	17,800	20,200	22,600	25,100	27,900
Ford Island	—	62,700	62,700	62,700	62,700	62,700
U.S. Coast Guard/Hawaii	—	13,100	13,100	13,100	13,100	13,100
National Guard	—	155,400	160,200	165,600	171,700	181,700
Total	68,390[b]					
Based Aircraft						
Honolulu International	0	151	158	166	173	181
Dillingham Airfield	0	13	14	15	16	17
Total	0	164	172	181	189	198

a. State of Hawaii, Department of Transportation
b. 1993 operations from U.S. Navy
Source: Aries Consultants Ltd.

The forecasts presented in Table 5-2 assume that Barbers Point is established as a new general aviation airport on Oahu by 1997 when NAS Barbers Point is scheduled to close and would accommodate some of the general aviation operations from Honolulu International Airport, the general aviation training operations at Ford Island and possibly some activity from Dillingham Airfield. For purposes of these forecasts, it is assumed that Barbers Point could serve at least 60 percent of the general aviation aircraft based at Honolulu International Airport. (This would exclude both fixed wing and helicopter commuter/air taxi aircraft.) In addition, based on the current distribution of aircraft owner addresses, Barbers Point could attract about 50 percent of the general aviation aircraft and operations at Dillingham Airfield. (This would exclude air taxi aircraft, e.g. gliders and tow planes.) Therefore, subject to the more detailed analysis the State is currently conducting, Barbers Point could attract about 198 aircraft by 2020.

General aviation aircraft operations could total about 168,600 operations by 2020. In addition, there would be an estimated 13,100 operations by the U.S. Coast Guard and Hawaii National Guard aircraft. Therefore operations could total 181,700 by 2020.

5.2 HAWAII COUNTY

Growth in aviation activity in Hawaii County will continue to favor Keahole-Kona International Airport. Most of the future growth in visitor activity and accommodations is expected to occur along the Kona and Kohala Coasts.

5.2.1 Hilo International Airport

The aviation demand forecasts for Hilo International Airport are presented in Table 5-3. The historical and forecast passenger volumes are illustrated on Figure 13.

5.2.1.1 Passengers

The total number of passengers (enplaned and deplaned) at Hilo International Airport is estimated to increase from 1,573,814 in 1992 to 2,196,000 by 2020, an average annual growth rate of 1.2 percent and an overall increase of 40 percent.

It is assumed that overseas service will not be reinstated at Hilo International Airport during the forecast period.

5.2.1.2 Air Cargo and Air Mail

With increased overseas service to Keahole-Kona International, it is expected that air cargo and mail volumes will increase at a slower rate at Hilo International Airport than at Keahole-Kona International Airport.

Total annual volumes of air cargo and mail are forecast to increase from 28,175 tons in 1992 to 33,000 tons by 2020, an overall increase of about 17 percent.

5.2.1.3 Aircraft Operations

Total aircraft operations are forecast to increase from 91,055 in 1992 to 126,300 operations by 2020, an overall increase of 39 percent.

Air carrier aircraft operations are forecast to increase from 21,426 in 1992 to 27,500 by 2020.

Commuter/air taxi operations are forecast to reach a level of 45,700 annual operations by 2020 compared to 37,182 operations in 1992. The level of air taxi operations is greatly influenced by the activity associated with the nearby Kilauea Volcano and this

Table 5-3

AVIATION DEMAND FORECASTS
Hilo International Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Overseas	167	0	0	0	0	0
-Mainland	1,573,647	1,827,000	1,929,000	2,026,000	2,116,000	2,196,000
Interisland	1,573,814	1,827,000	1,929,000	2,026,000	2,116,000	2,196,000
Total						
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	25,056	25,600	26,400	27,300	28,200	29,100
Mail (tons)	3,119	3,400	3,600	3,700	3,800	3,900
Total	28,175	29,000	30,000	31,000	32,000	33,000
Aircraft Operations						
Air carrier	21,426	24,700	26,100	26,700	27,100	27,500
Commuter/air taxi	37,182	39,300	41,200	42,900	44,400	45,700
General aviation	21,593	26,000	28,000	30,000	32,000	34,000
Military	10,854	19,400	19,100	19,100	19,100	19,100
Total	91,055	109,400	114,400	118,700	122,600	126,300
Based Aircraft	39	42	45	48	51	54

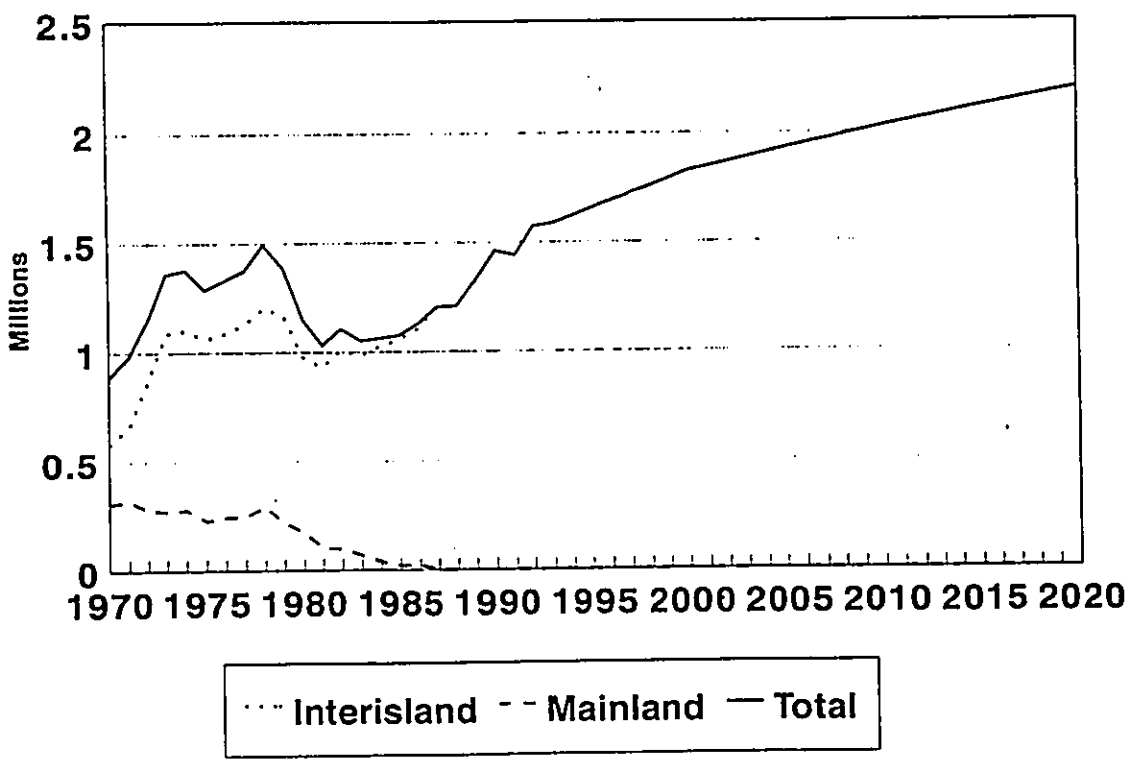
a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

FIGURE 13

HILO INTERNATIONAL AIRPORT

Historical and Forecast Passengers



Source: Aries Consultants Ltd.

has been particularly true in recent years. On this basis about 80 percent of the commuter/air taxi operations are estimated to be helicopter operations.

General aviation operations have been forecast to show a moderate growth from 21,503 operations in 1992 to 34,000 operations by 2020.

Military aircraft operations have been forecast to remain at a level of about 19,000 operations through 2020.

Based Aircraft. The number of based aircraft is expected to increase from 39 in 1992 to 54 by 2020.

5.2.2 Keahole-Kona International Airport

The aviation demand forecasts for Keahole-Kona International Airport are presented in Table 5-4. The historical and forecast passenger volumes are illustrated on Figure 14.

5.2.2.1 Passengers

High growth rates are forecast for Keahole-Kona International Airport as existing and planned-for development on the Big Island continues to occur along the Kona and Kohala Coasts.

The total number of passengers (enplaned and deplaned) at Keahole-Kona International Airport is estimated to increase from 2,161,936 in 1992 to 3,780,000 by 2020, an annual average growth rate of 2.0 percent and an overall increase of 75 percent.

Overseas passengers are forecast to increase from 278,995 in 1992 to 1,270,000 by 2020, an overall increase of 355 percent. Overseas passengers are forecast to account for an increasing share of the total passengers at the Keahole-Kona International Airport, increasing from 13 percent in 1992 to 34 percent by 2020.

Interisland passengers will continue to account for the majority of the passengers in the future, increasing from 1,882,941 in 1992 to 2,510,000 by 2020, an overall increase of 33 percent. However, interisland air carrier passengers are expected to decrease from 87 percent of the total in 1992 to 66 percent of the total by 2020.

Table 5-4

AVIATION DEMAND FORECASTS
Keahole-Kona International Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Overseas						
-Mainland	278,995	445,000	619,000	816,000	1,034,000	1,270,000
Interisland	1,882,941	2,209,000	2,304,000	2,385,000	2,455,000	2,510,000
Total	2,161,936	2,654,000	2,923,000	3,201,000	3,489,000	3,780,000
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	19,766	22,900	25,500	28,100	30,800	32,600
Mail (tons)	2,579	3,100	3,500	3,900	4,200	4,400
Total	22,345	26,000	29,000	32,000	35,000	37,000
Aircraft Operations						
Air carrier	29,477	32,100	32,200	34,300	36,000	37,000
Commuter/air taxi	9,200	13,400	14,600	15,800	17,000	18,200
General aviation	21,066	20,000	21,000	22,000	23,000	24,000
Military	4,196	12,900	12,700	12,700	12,700	12,700
Total	63,989	78,400	81,500	84,800	88,700	91,900
Based Aircraft	32	36	38	40	42	44

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

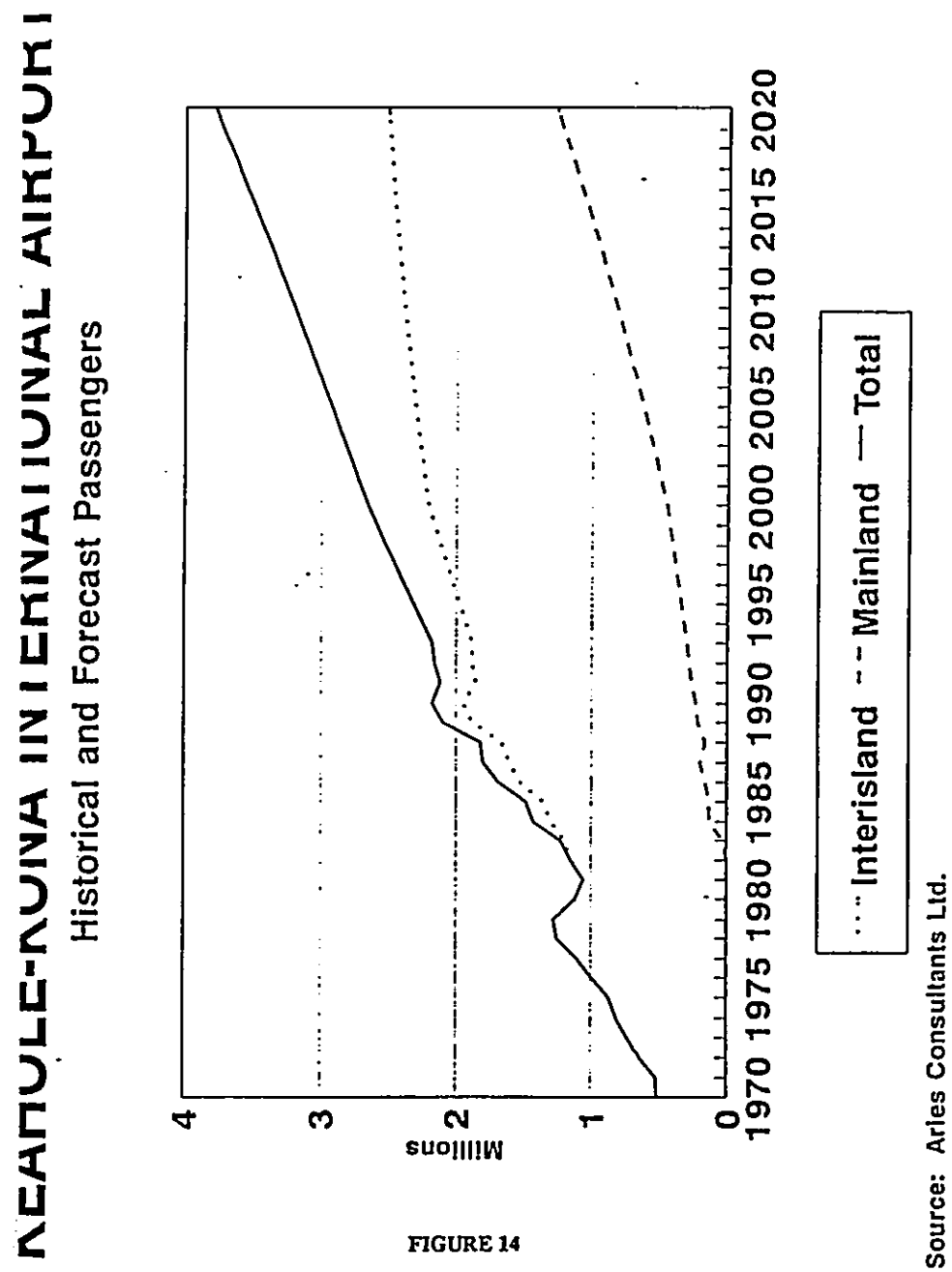


FIGURE 14

5.2.2.2 Air Cargo and Air Mail

With increased overseas service to Keahole-Kona International Airport, the volumes of air cargo and mail will increase at a faster rate than at Hilo International Airport. Total volumes of air cargo and mail are forecast to increase from 23,345 tons in 1992 to 37,000 tons by 2020, an overall increase of 66 percent.

5.2.2.3 Aircraft Operations

Total aircraft operations are forecast to increase from 63,989 in 1992 to 91,900 operations by 2020, an overall increase of 44 percent.

Air carrier aircraft operations are forecast to increase from 29,477 in 1992 to 37,000 by 2020.

Commuter/air taxi operations are forecast to increase from 9,200 operations in 1992 to 18,200 operations by 2020. About 45 percent of the commuter/air taxi operations are forecast to be helicopter operations by 2020 with an increasing percentage of helicopter air taxi sightseeing flights over the forecast period.

General aviation operations have been forecast to show a moderate growth from 21,066 operations in 1992 to 24,000 operations by 2020.

Military aircraft operations have been forecast to be at a level of about 13,000 annual operations through 2020.

Based Aircraft. The number of based aircraft is expected to increase from 32 aircraft in 1992 to 44 aircraft by 2020. A significant part of the increase is expected to be accounted for by increased use of helicopters for sightseeing flights.

5.2.3 Waimea-Kohala Airport

The aviation demand forecasts for Waimea-Kohala Airport are presented in Table 5-5.

5.2.3.1 Passengers

Aloha Island Air suspended scheduled service in January 1993 but Trans Air is now providing scheduled service under the Essential Air Service Program. It is assumed that there will be interisland service to the Airport in the future. There could be increases if the Airport plays a greater role in accommodating some of the aviation demand associated with the growing visitor and residential development along the Kona and Kohala coasts.

The total number of passengers (enplaned and deplaned) is forecast to increase from 14,011 in 1992 to 24,000 by 2020, an annual average growth rate of 1.9 percent and an overall increase of 71 percent. It is assumed that Waimea-Kohala will continue to be served only by commuter airlines.

5.2.3.2 Aircraft Operations

Commuter taxi operations are forecast to increase from about 8,076 operations in 1992 to 13,100 operations by 2020. This includes a significant increase in helicopter sightseeing operations.

General aviation operations are estimated to reach 800 operations by 2020.

Military operations are expected to remain at the current level of about 100 operations annually.

Based Aircraft. Based aircraft are forecast to increase from 9 in 1992 to 12 by 2020.

5.2.4 Upolu Airport

The aviation demand forecasts for Upolu Airport are presented in Table 5-5.

5.2.4.1 Passengers

No passenger activity has been reported at Upolu Airport since 1986, and it is assumed that no commuter airline service will be provided during the forecast period.

5.2.4.2 Aircraft Operations

Commuter/air taxi operations are forecast to remain at about 100 operations through 2020. General aviation operations are forecast to reach 300 operations by 2020. Military operations are expected to remain at a level of about 100 operations annually.

Based Aircraft. No based aircraft are forecast at the Airport.

Table 5-5

AVIATION DEMAND FORECASTS
Other Hawaii County Airports
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
WAIMEA-KOHALA						
Passengers (Total)	14,011	18,000	19,000	21,000	22,000	24,000
Aircraft Operations						
Commuter/air taxi	8,076	9,700	10,600	11,400	11,900	13,100
General aviation	500	600	600	700	700	800
Military	50	100	100	100	100	100
Total	8,626	10,400	11,300	12,200	12,700	14,000
Based Aircraft	9	10	10	11	11	12
UPOLU						
Aircraft Operations						
Commuter/air taxi	60	100	100	100	100	100
General aviation	275	300	300	300	300	300
Military	50	100	100	100	100	100
Total	385	500	500	500	500	500
Based Aircraft	0	0	0	0	0	0

a. State of Hawaii, Department of Transportation and latest FAA Airport Master Records, Form 5010-1

Source: Aries Consultants Ltd.

5.3 KAUAI COUNTY

Continued growth of aviation activities on Kauai is forecast, with significant gains in interisland and overseas passenger activity at Lihue Airport which will remain the principal airport on the island. Scheduled commuter airline service will also increase at the currently privately-owned Princeville Airport. The forecasts assume that aviation activity will have recovered from the effects of Hurricane Iniki in 1992 by the year 2000.

5.3.1 Lihue Airport

The aviation demand forecasts for Lihue Airport are presented in Table 5-6. The historical and forecast passenger volumes are illustrated on Figure 15.

5.3.1.1 Passengers

The total number of passengers (enplaned and deplaned) at Lihue Airport is estimated to increase from 2,382,267 in 1992 to 3,838,000 by 2020, an annual average growth rate of 1.7 percent and an overall increase of 61 percent. (Note: Hurricane Iniki struck on September 11, 1992.)

Overseas passengers are forecast to increase from 106,102 in 1992 to 635,000 by 2020, an overall increase of 498 percent. Overseas passengers are forecast to account for an increasing share of the total passengers at the Lihue Airport, increasing from 6 percent in 1991 to an estimated 17 percent by 2020.

Interisland passengers will continue to account for the majority of the passengers in the future, increasing from 2,276,165 in 1992 to 3,203,000 by 2020. However, interisland passengers are expected to decrease from 94 percent of the total in 1991 to 83 percent of the total by 2020.

5.3.1.2 Air Cargo and Air Mail

Total volumes of air cargo and mail are forecast to increase from 19,221 tons in 1992 to 31,000 tons by 2020, an overall increase of 61 percent.

5.3.1.3 Aircraft Operations

Total aircraft operations are forecast to increase from 103,686 in 1992 to 156,600 by 2020, an overall increase of 51 percent.

Table 5-6

AVIATION DEMAND FORECASTS
Lihue Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Overseas	106,102	222,000	310,000	408,000	517,000	635,000
-Mainland	2,276,165	2,647,000	2,801,000	2,945,000	3,079,000	3,203,000
Interisland	2,382,267	2,869,000	3,111,000	3,353,000	3,596,000	3,838,000
Total						
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	16,775	18,200	20,000	22,900	24,800	27,700
Mail (tons)	2,446	2,800	3,000	3,100	3,200	3,300
Total	19,221	21,000	23,000	26,000	28,000	31,000
Aircraft Operations						
Air carrier	29,564	33,200	34,400	35,600	37,300	38,300
Commuter/air taxi	48,387	73,900	80,100	86,300	92,400	98,600
General aviation	16,172	9,500	10,000	10,500	11,000	11,500
Military	9,563	8,200	8,200	8,200	8,200	8,200
Total	103,686	124,800	132,700	140,600	148,900	156,600
Based Aircraft	42	47	51	54	57	60

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

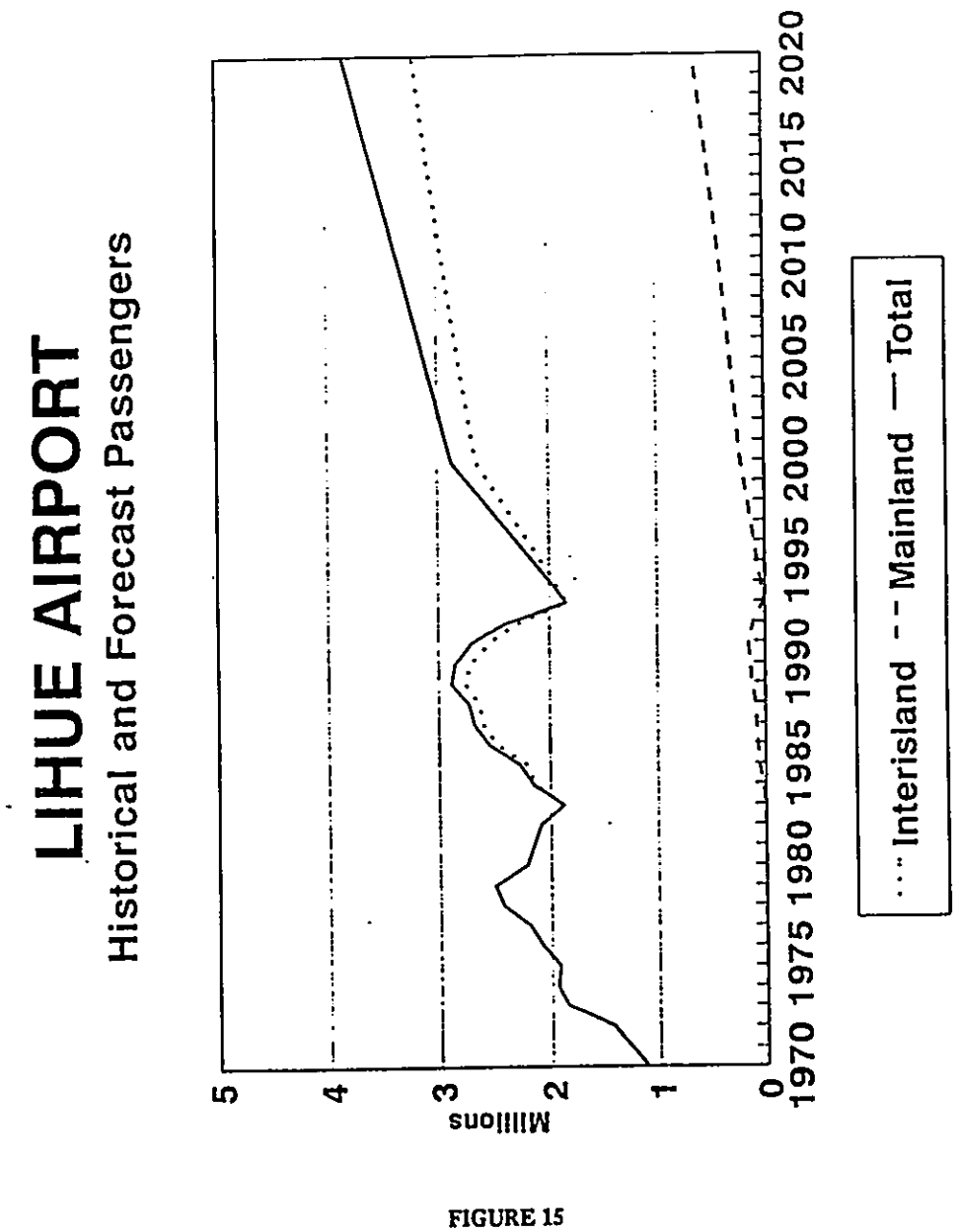


FIGURE 15

Source: Aries Consultants Ltd.

Air carrier aircraft operations are forecast to increase from 29,564 operations in 1992 to 38,300 operations by 2020.

Commuter/air taxi operations are forecast to increase from 48,387 annual operations in 1992 to 98,600 operations by 2020. About 85 percent of the commuter/air taxi operations were helicopter operations prior to Hurricane Iniki and helicopters are forecast to reach this level again in the future. (Note: The number of helicopter operations has decreased in the last two years because of Hurricane Iniki.)

General aviation operations have fluctuated in recent years between 7,000 and 16,000 operations and are forecast to reach a level of 11,500 operations by 2020.

Military operations have been forecast to remain at a level of 8,200 operations through 2020.

Based Aircraft. The number of based aircraft is expected to increase from 42 aircraft in 1992 to 60 aircraft by 2020. Much of the increase is expected to be accounted for by increased helicopters for use in sightseeing flights.

5.3.2 Princeville Airport

Princeville Airport is assumed to continue to serve the North Shore of Kauai and particularly the Princeville resort and residential development. The aviation demand forecasts for Princeville Airport are presented in Table 5-7.

5.3.2.1 Passengers

The total number of passengers (enplaned and deplaned) at Princeville Airport is forecast to increase from 45,867 in 1992 to 62,000 by 2020, an overall increase of about 35 percent. It is assumed that Princeville will continue to be served only by commuter airlines.

5.3.2.2 Aircraft Operations

Commuter/air taxi operations are forecast to increase from an estimated 29,930 operations in 1992 to 40,600 operations by 2020. It is estimated that about 10 percent of these operations will be by fixed-wing aircraft and about 90 percent of the operations by helicopters by 2020.

General aviation operations are estimated to reach 200 operations by 2020.

Table 5-7

AVIATION DEMAND FORECASTS
Other Kauai County Airports
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
PORT ALLEN						
Aircraft Operations						
Commuter/air taxi	12,690	14,000	15,000	16,000	17,000	19,000
General aviation	700	1,000	1,000	1,000	1,000	1,000
Total	13,390	15,000	16,000	17,000	18,100	19,000
Based Aircraft	1	1	2	2	3	3
PRINCEVILLE						
Passengers (Total)	45,867	47,000	51,000	55,000	58,000	62,000
Aircraft Operations						
Commuter/air taxi	29,930	30,800	33,400	36,000	38,000	40,600
General aviation	100	150	170	180	190	200
Total	30,030	30,950	33,570	36,180	38,190	40,800
Based Aircraft	7	8	8	9	9	10

a. State of Hawaii, Department of Transportation and FAA Airport Master Records, Form 5010-1

Source: Aries Consultants Ltd.

Based Aircraft. The number of based aircraft is forecast to increase from 7 aircraft in 1992 to 10 aircraft by 2020. Most of the aircraft are expected to continue to be helicopters for use in sightseeing flights.

5.3.3 Port Allen Airport

Port Allen Airport is assumed to continue to accommodate helicopter and glider air taxi operations. Scheduled commuter airline service is not anticipated at the Airport. The aviation demand forecasts for Port Allen Airport are presented in Table 5-7.

5.3.3.1 Aircraft Operations

Commuter/air taxi operations are forecast to increase from about 12,690 operations in 1992 to 18,000 operations by 2020. These include both sightseeing helicopter as well as glider and tow plane air taxi operations.

General aviation operations are estimated to reach 1,000 operations by 2020.

Based Aircraft. The number of based aircraft is expected to increase from 1 to 3 aircraft through 2020.

5.4 MAUI COUNTY

Aviation demand forecasts for the following airports are presented in this section -- Kahului, Kapalua and Hana Airports on the Island of Maui; Molokai and Kalaupapa Airports on the Island of Molokai, and Lanai Airport on the Island of Lanai. Continued growth of aviation activity is forecast at all of the principal airports serving the islands of Maui, Molokai and Lanai.

It is assumed that all overseas flights to Maui County will continue to be at the Kahului Airport.

5.4.1 Kahului Airport

The aviation demand forecasts for Kahului Airport are presented in Table 5-8. The historical and forecast passenger volumes are illustrated on Figure 16.

5.4.1.1 Passengers

Kahului Airport will remain the principal airport on the Island of Maui as aviation demands continue to increase with the Island's growing visitor industry. Increased direct overseas service to the Island will contribute significantly to the increased aviation demand.

The total number of passengers (enplaned and deplaned) at Kahului Airport is estimated to increase from 5,182,510 in 1992 to 9,712,000 by 2020, an annual average growth rate of 2.3 percent and overall increase of 87 percent.

Overseas passengers are forecast to increase from 1,281,797 in 1992 to 2,541,000 by 2020, an overall increase of 98 percent. Overseas passengers are forecast to account for an increasing share of the total passengers at the Kahului Airport, increasing from 25 percent to an estimated 26 percent by 2020.

Interisland passengers will continue to account for the majority of the passengers in the future, increasing from 3,900,713 in 1992 to 7,171,000 by 2020. However, interisland passengers are expected to decrease from 75 percent of the total in 1992 to 74 percent of the total by 2020.

5.4.1.2 Air Cargo and Air Mail

Total annual volumes of air cargo and mail are forecast to increase from 44,823 tons in 1992 to 70,000 by 2020, an overall increase of about 56 percent.

Table 5-8

AVIATION DEMAND FORECASTS
Kahului Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Overseas						
-Mainland	1,281,797	1,557,000	1,796,000	2,041,000	2,290,000	2,541,000
Interisland	3,900,713	4,744,000	5,344,000	5,947,000	6,556,000	7,171,000
Total	5,182,510	6,301,000	7,140,000	7,988,000	8,846,000	9,712,000
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	40,271	42,000	47,200	51,600	57,000	62,300
Mail (tons)	4,552	5,000	5,800	6,400	7,000	7,700
Total	44,823	47,000	53,000	58,000	64,000	70,000
Aircraft Operations						
Air carrier	57,159	66,900	73,900	80,700	86,700	93,100
Commuter/air taxi	68,832	90,000	101,200	112,300	123,400	134,500
General aviation	47,281	41,000	45,000	49,000	53,000	58,000
Military	5,480	12,000	11,700	11,700	11,700	11,700
Total	178,752	209,900	231,800	253,700	274,800	297,300
Based Aircraft	75	82	88	94	100	106

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

5.4.1.3 Aircraft Operations

Total aircraft operations are forecast to increase from 178,752 in 1992 to 297,300 operations by 2020, an overall increase of 66 percent.

Air carrier aircraft operations are forecast to increase from 57,159 in 1992 to 93,100 by 2020.

Commuter/air taxi operations are forecast to increase from 68,832 operations in 1992 to 134,200 operations by 2020. Helicopter air taxi operations are increasing at the Airport and are forecast to account for about 80 percent of the commuter/air taxi operations by 2020. (It should be noted that the State is currently studying the potential for a reliever airport on Maui that could accommodate the helicopter operations.)

General aviation operations are forecast to increase from 47,281 operations in 1992 to 58,000 operations by 2020.

Military aircraft operations have been forecast to be at a level of about 12,000 operations through 2020.

Based Aircraft. The number of based aircraft is expected to increase from 75 in 1992 to 106 by 2020. A significant portion of the increase is expected to be accounted for by increased numbers of sightseeing helicopters.

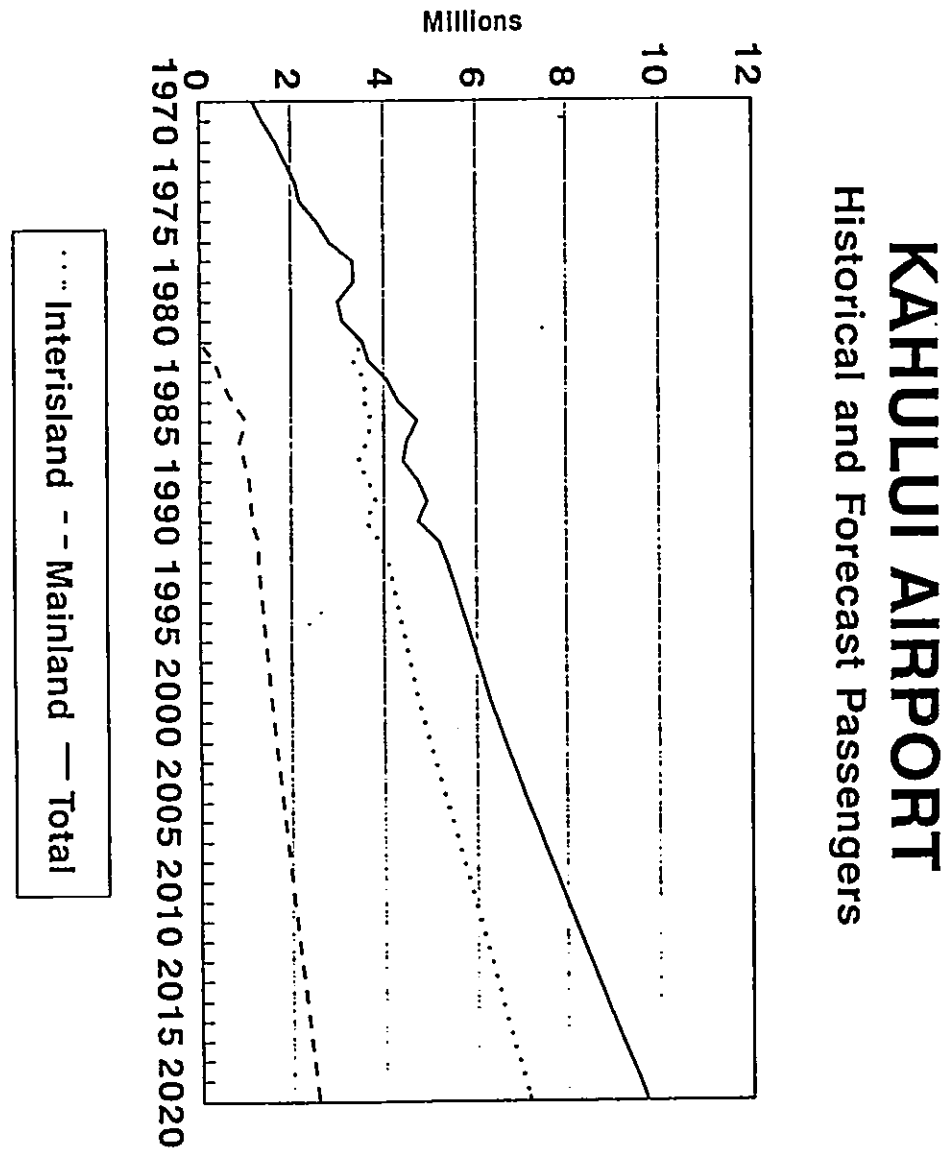
5.4.2 Kapalua Airport

The Kapalua Airport opened in February 1987 and was acquired by the State of Hawaii in October 1992. The Airport is served by interisland commuter/air taxi aircraft. Administrative Rules between Hawaiian Airlines (the former Airport operator), Maui County and Maui Land and Pineapple Company (the landowner) limit daily aircraft flights to a maximum of 35 daily flights by aircraft seating 25 or fewer passengers. The Administrative Rules also preclude the use of jet-powered aircraft and any evening operations. These restrictions impose a practical limit on the number of passengers that could be accommodated at the Airport. The aviation demand forecasts for the Kapalua Airport are presented in Table 5-9.

5.4.2.1 Passengers

The total numbers of passengers (enplaned and deplaned) at Kapalua Airport is estimated to increase from 333,514 in 1992 to 519,000 by 2020, an annual average growth rate of 1.6 percent and an overall increase of 56 percent.

FIGURE 16



Source: Aries Consultants Ltd.

Table 5-9

AVIATION DEMAND FORECASTS
Other Maui County Airports
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
KAPALUA						
Passengers(Total)	333,514	425,000	454,000	478,000	505,000	519,000
Cargo and Mail (tons)	693	1,000	1,100	1,200	1,300	1,400
Aircraft Operations						
Commuter/air taxi	18,794	31,300	29,600	27,900	26,700	25,100
General aviation	-0-	-0-	-0-	-0-	-0-	-0-
Total	18,794	31,300	29,600	27,900	26,700	25,100
Based Aircraft	0	0	0	0	0	0
HANA						
Passengers(Total)	22,213	22,000	25,000	28,000	30,000	33,000
Aircraft Operations						
Commuter/air taxi	6,358	7,200	8,200	9,200	9,900	10,800
General aviation	650	700	700	700	800	800
Military	5	0	0	0	0	0
Total	7,013	7,900	8,900	9,900	10,700	11,600
Based Aircraft	0	1	1	1	2	2

Table 5-9 -- continued

	Actual[a] 1992	2000	2005	2010	2015	2020
LANAI						
Passengers (Total)	138,672	168,000	190,000	211,000	233,000	254,000
Cargo and Mail (tons)	1,714	1,000	1,500	2,000	2,500	3,000
Aircraft Operations						
Air Carrier	2,502	1,900	2,200	2,400	2,700	2,900
Commuter/air taxi	14,600	6,400	6,600	6,800	7,000	7,100
General aviation	4,500	4,800	5,000	5,200	5,400	5,600
Military	100	100	100	100	100	100
Total	21,702	13,200	13,900	14,500	15,200	15,700
Based Aircraft	0	1	2	2	2	2
KALAUPAPA						
Passengers (Total)	13,528	15,000	17,000	18,000	20,000	22,000
Aircraft Operations						
Commuter/air taxi	4,512	3,500	4,000	4,200	4,700	5,200
General aviation	1,500	1,600	1,700	1,800	1,900	2,000
Military	1,000	1,000	1,000	1,000	1,000	1,000
Total	7,012	6,100	6,700	7,000	7,600	8,200
Based Aircraft	0	0	0	0	0	0

a. State of Hawaii, Department of Transportation and latest FAA Airport Master Records, Form 5010-1

Source: Aries Consultants Ltd.

5.4.2.2 Aircraft Operations

Commuter/air taxi operations are forecast to increase from 18,795 in 1992 to 31,300 by 2000 if only the existing small commuter aircraft (e.g. DHC-6) are available. As new larger commuter aircraft (e.g. ATR-42, DHC-8, Saab 340) that can operate at the Airport are gradually introduced the number of commuter operations is expected to decline to 25,100 operations by 2020. The commuter/air taxi operations are assumed not to include any helicopter operations.

The current restriction on any general aviation activity has been retained.

Based Aircraft. There are no aircraft forecast to be based at the Airport.

5.4.3 Hana Airport

The aviation demand forecasts for the Hana Airport are presented in Table 5-9.

5.4.3.1 Passengers

The total number of passengers (enplaned and deplaned) at Hana Airport is estimated to increase from 22,213 in 1992 to 33,000 by 2020, an annual average growth rate of 1.4 percent and an overall increase of 49 percent. It is assumed that Hana will continue to be served only by scheduled commuter service.

5.4.3.2 Aircraft Operations

Commuter/air taxi operations are forecast to increase from 6,358 operations in 1992 to 10,800 operations by 2020. This includes helicopter sightseeing and glider and tow plane operations.

General aviation operations are estimated to reach 800 by 2020.

Based Aircraft. Based aircraft are forecast to increase from zero in 1992 to 2 by 2020.

5.4.4 Molokai Airport

The aviation demand forecasts for the Molokai Airport are presented in Table 5-10.

Table 5-10

AVIATION DEMAND FORECASTS
Molokai Airport
1992-2020

ANNUAL FORECASTS	Actual[a] 1992	2000	2005	2010	2015	2020
Passengers (Enplaned and Deplaned)						
Interisland	314,489	396,000	429,000	459,000	475,000	497,000
Cargo and Mail (Enplaned and Deplaned)						
Cargo (tons)	1,064	2,700	3,050	3,400	3,750	4,100
Mail (tons)	95	300	350	400	450	500
Total	1,159	3,000	3,400	3,800	4,200	4,600
Aircraft Operations						
Air carrier	148	3,800	4,100	4,400	4,600	4,800
Commuter/air taxi	23,644	18,700	18,900	19,000	18,500	18,300
General aviation	9,553	10,000	10,500	11,000	11,500	12,000
Military	2,317	4,900	4,700	4,700	4,700	4,700
Total	35,662	37,400	38,200	39,100	39,300	39,800
Based Aircraft	3	4	4	5	5	5

a. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

5.4.4.1 Passengers

The total number of passengers (enplaned and deplaned) at Molokai Airport is estimated to increase from 314,489 in 1992 to 497,000 by 2020, an annual average growth rate of 1.6 percent and an overall increase of 58 percent.

5.4.4.2 Air Cargo and Air Mail

Total volumes of air cargo and mail are forecast to increase from an estimated 1,159 tons in 1992 to 4,600 tons by 2020, an overall increase of 296 percent. (This growth reflects some underreporting of cargo and mail volumes in the past.)

5.4.4.3 Aircraft Operations

Total aircraft operations are forecast to increase from 35,662 in 1992 to 39,800 operations by 2020. This reflects the reintroduction of air carrier service using larger aircraft than commuter aircraft. With the phase out of the DHC-7, scheduled air carrier jet service is now being provided at the Molokai Airport. It is assumed that scheduled jet service will continue to be provided in the future together with service by new commuter aircraft (e.g. ATR42, DHC-8, Saab 340).

Air carrier aircraft operations are forecast to increase from 148 operations in 1992 to 4,800 operations by 2020.

Commuter/air taxi operations are forecast to decline from 23,644 operations in 1992 to 18,300 operations by 2020 with the reintroduction and continued provision of scheduled jet service.

General aviation operations are forecast to show a modest growth from 9,553 operations in 1992 to 12,000 operations by 2020.

Military operations have been forecast to reach a level of 4,700 operations annually.

Based Aircraft. The number of based aircraft is expected to increase from three aircraft in 1992 to 5 aircraft by 2020.

5.4.5 Kalaupapa Airport

Residents of the Kalaupapa Settlement have limited the number of daily visitors to the Settlement to 100 visitors per day. It is assumed that this visitor level will not be

raised during the forecast period. At present there are less than 20 daily visitors by air to Kalaupapa. The aviation demand forecasts for Kalaupapa Airport are presented in Table 5-9.

5.4.5.1 Passengers

The total number of passengers (enplaned and deplaned) at Kalaupapa Airport is estimated to increase from 13,528 in 1992 to 22,000 by 2020, an annual average growth rate of 1.8 percent and an overall increase of 63 percent. It is assumed that Kalaupapa will continue to be served only by commuter airlines.

5.4.5.2 Aircraft Operations

Commuter/air taxi operations are forecast to increase from about 4,512 operations in 1992 to 5,200 operations by 2020.

General aviation operations are estimated to reach 2,000 operations by 2020.

Military aircraft operations have been forecast to remain at a level of 1,000 operations through 2020.

Based Aircraft. There are no aircraft forecast to be based at the Airport.

5.4.6 Lanai Airport

The aviation demand forecasts for the Lanai Airport are presented in Table 5-9.

5.4.6.1 Passengers

The total number of passengers (enplaned and deplaned) at Lanai Airport is estimated to increase from 138,672 in 1992 to 254,000 by 2020, an annual average growth rate of 2.2 percent and an overall increase of 97 percent, reflecting the recent resort development on the Island.

5.4.6.2 Air Cargo and Air Mail

Total volumes of air cargo and mail are forecast to increase from an estimated 1,714 tons in 1992 to 3,000 tons by 2020, an overall increase of 75 percent.

5.4.6.3 Aircraft Operations

Total aircraft operations are forecast to decline from about 21,700 operations in 1992 to 15,700 operations by 2020. This reflects the reintroduction of air carrier service using larger aircraft than commuter aircraft. With the phase out of the DHC-7, scheduled air carrier jet service is now being provided at the Lanai Airport. It is assumed that scheduled jet service will continue to be provided in the future together with service by new commuter aircraft (e.g. ATR42, DHC-8, Saab 340).

Air carrier operations are forecast to increase from 2,502 operations in 1992 to 2,900 operations by 2020.

Commuter/air taxi operations are forecast to decline from about 14,600 operations in 1992 to 7,100 operations by 2020, reflecting the reintroduction and continued provision of scheduled air carrier service using larger jet aircraft.

General aviation operations are forecast to increase from about 4,500 operations in 1992 to 5,600 operations by 2020.

Military aircraft operations have been forecast to remain at a level of 100 operations through 2020.

Based Aircraft. The number of based aircraft is expected to increase to two (2) by 2020.

SECTION 6.0

SCENARIO TWO - PASSENGER DEMAND FORECASTS

6.1 Scenario Two - Passenger Demand Forecasts

Tables 6-1 and 6-2 present the results of the high and low range of passenger demand forecasts for the Honolulu International, Kahului and Keahole-Kona International Airports for Scenario Two.

For Scenario Two it is assumed that nonstop direct international service to the Neighbor Islands will occur within the forecast period. Based on the discussions conducted as part of this study, the potential level of international passengers to the Neighbor Islands will depend on several factors, including:

- The potential attractiveness of the Neighbor Islands to international visitors compared to Oahu (e.g., hotels, shopping, restaurants, and golf courses).
- The availability of visitor facilities including hotels, shops, restaurants, and the infrastructure (e.g., housing, roads and utilities) and staffing necessary to support these facilities.
- The availability of airport facilities and services, e.g., runway length and strength, international terminal building facilities, federal inspection services and staffing.

The majority of the international air carriers currently serving the Hawaii market have not indicated any current plans for direct international service to the Neighbor Islands, at least in the short-term (over the next five years). However, Japan Airlines has expressed an interest to commence direct international flights from Japan to Keahole-Kona International and Kahului Airports.

For the purpose of this scenario it has been assumed that only the Japanese market could generate sufficient passengers to support international service to the Neighbor Islands. Japanese visitors currently represent 23 percent of the total overseas visitors and were forecast to account for 25 percent of the visitor arrivals through 2010 based on the 1988 M-K Series projections. Based on discussions conducted as part of this study, it is assumed that Kahului and Keahole-Kona International could have direct international service within the forecast period assuming adequate international airport facilities and services are available and appropriate international bilateral agreements negotiated.

Table 6-1

HIGH PASSENGER FORECASTS
Scenario Two (55 Percent Mainland/45 Percent International)
1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
HONOLULU INTERNATIONAL						
Overseas						
- Mainland	7,323,468	9,874,000	10,773,000	11,573,000	12,259,000	12,865,000
- International	5,345,579	7,104,000	8,627,000	9,734,000	11,374,000	13,158,000
Subtotal	12,669,047	16,978,000	19,400,000	21,307,000	23,633,000	26,023,000
Interisland	8,621,097	11,142,000	12,257,000	12,717,000	13,487,000	14,076,000
TOTAL	21,290,144	28,120,000	31,657,000	34,024,000	37,120,000	40,099,000
KEAHOLE-KONA INTERNATIONAL						
Overseas						
- Mainland	278,995	494,000	690,000	914,000	1,160,000	1,429,000
- International	0	145,000	203,000	275,000	375,000	483,000
Interisland	1,882,941	2,272,000	2,536,000	2,780,000	2,996,000	3,204,000
TOTAL	2,161,936	2,911,000	3,429,000	3,969,000	4,531,000	5,116,000
KAHULUI						
Overseas						
- Mainland	1,281,797	1,728,000	2,002,000	2,284,000	2,568,000	2,859,000
- International	0	0	0	571,000	750,000	980,000
Interisland	3,900,713	4,983,000	5,668,000	5,787,000	6,306,000	6,778,000
TOTAL	5,182,510	6,711,000	7,670,000	8,642,000	9,624,000	10,617,000

a. State of Hawaii, Department of Transportation
Source: Aries Consultants Ltd.

Table 6-2

LOW PASSENGER FORECASTS
Scenario Two (55 Percent Mainland/45 Percent International)
1992-2020

County/Airport	Actual[a] 1992	2000	2005	2010	2015	2020
HONOLULU INTERNATIONAL						
Overseas						
- Mainland	7,323,468	8,894,000	9,660,000	10,340,000	10,932,000	11,434,000
- International	5,345,579	6,399,000	7,736,000	8,697,000	10,141,000	11,694,000
Subtotal	12,669,047	15,293,000	17,396,000	19,037,000	21,073,000	23,128,000
Interisland	8,621,097	9,812,000	11,069,000	11,740,000	12,674,000	13,490,000
TOTAL	21,290,144	25,105,000	28,465,000	30,777,000	33,747,000	36,618,000
KEAHOLE-KONA INTERNATIONAL						
Overseas						
- Mainland	278,995	445,000	619,000	816,000	1,034,000	1,270,000
- International	0	131,000	182,000	246,000	334,000	429,000
Interisland	1,882,941	2,078,000	2,122,000	2,139,000	2,121,000	2,081,000
TOTAL	2,161,936	2,654,000	2,923,000	3,201,000	3,489,000	3,780,000
KAHULUI						
Overseas						
- Mainland	1,281,797	1,557,000	1,796,000	2,041,000	2,290,000	2,541,000
- International	0	0	0	511,000	669,000	870,000
Interisland	3,900,713	4,744,000	5,344,000	5,436,000	5,887,000	6,301,000
TOTAL	5,182,510	6,301,000	7,140,000	7,988,000	8,846,000	9,712,000

a. State of Hawaii, Department of Transportation
Source: Aries Consultants Ltd.

Based on the most recent Hawaii Visitors Bureau data, approximately 8 percent of the International eastbound visitors already only visit the Neighbor Islands even though they arrive and depart through Honolulu International Airport (5 percent to Maui, 2 percent to Hawaii and one percent to Kauai).

It is assumed that an increasing percentage of the Japanese visitors, up to 10 percent of the total Japanese visitors by 2020, would fly directly to the Neighbor Islands. By 2000, it is assumed Keahole-Kona International Airport would account for approximately 2 percent of the International passengers to the State. Following inception of direct international flights to Kahului, it is assumed that by 2020 Kahului would accommodate 6.7 percent of the International passengers and Keahole 3.3 percent of the Statewide International passengers.

Until the subject of international flights is fully analyzed in an Environmental Impact Statement, to be prepared by the State Department of Transportation, the State can not allow regularly scheduled international flights at Kahului Airport. In addition, it was assumed in the 1993 Airport Master Plan that an International Arrivals Facility would not be constructed before 2010 at Kahului Airport.

Based on discussions with airline and tour operators, it is expected that most of the passengers flying internationally to the Neighbor Islands would be repeat visitors to the State and would not choose to visit Oahu as most first time visitors do. Therefore the number of interisland passengers would change from Scenario One for these airports as these international passengers to the Neighbor Islands are likely not to spend part of their visit to Hawaii in Honolulu.

6.1.1 Honolulu International Airport

Based on the 1994 high range of passenger activity, the total number of passengers at Honolulu International Airport is estimated to increase from 21,290,144 passengers in 1992 to 40,099,000 passengers by 2020, an overall increase of 88 percent. The total overseas passengers would increase from 12,669,047 passengers in 1992 to 26,023,000 by 2020, an overall increase of 105 percent. However, the share of overseas passengers at Honolulu International Airport would decrease from 88 percent of the State total in 1992 to 80 percent by 2020. There would be an estimated 13,158,000 International passengers at the Airport by 2020 compared to 14,620,000 International passengers for Scenario One.

Based on the 1994 low range of passenger activity, the total number of passengers at Honolulu International Airport is estimated to increase from 21,290,144 passengers in 1992 to 36,618,000 passengers by 2020, an overall increase of 72 percent. The total overseas passengers would increase from 12,669,047 passengers in 1992 to 23,812,000

by 2020, an overall increase of 83 percent. However, the share of overseas passengers at Honolulu International Airport would decrease from 88 percent of the State total in 1992 to 80 percent by 2020. There would be an estimated 11,694,000 International passengers at the Airport by 2020 compared to 12,915,000 International passengers for Scenario One.

Scheduled international air carrier operations would decline by about 600 operations in 2000, 3,200 in 2010 and 4,900 in 2020. Compared to the Scenario One forecasts presented in Table 5-1 there would also be a reduction in interisland air carrier operations of about 1,600 in 2000, 8,900 in 2010 and 14,500 in 2020.

6.1.2 Keahole-Kona International Airport

Based on the 1994 high range of passenger activity, the total number of passengers at Keahole-Kona International Airport is estimated to increase from 2,161,936 passengers in 1992 to 5,116,000 passengers by 2020, an overall increase of 137 percent. By 2020, it is assumed that Keahole-Kona International Airport will receive international direct service. International passengers are forecast to increase from 145,000 by 2000 to 483,000 by 2020. This will increase the total overseas passengers at Keahole-Kona International Airport from 278,995 in 1992 to 1,912,000 by 2020.

Based on the 1994 low range of passenger activity, the total number of passengers at Keahole-Kona International Airport is estimated to increase from 2,161,936 passengers in 1992 to 3,780,000 passengers by 2020, an overall increase of 75 percent. By 2020, it is assumed that Keahole-Kona International Airport will receive international direct service. International passengers are forecast to increase from 131,000 by 2000 to 429,000 by 2020. This will increase the total overseas passengers at Keahole-Kona International Airport from 278,995 in 1992 to 1,699,000 by 2020.

Scheduled international passenger service would add about 600 international air carrier operations in 2000, 1,000 in 2010 and 1,600 in 2020 compared to the Scenario One forecasts presented in Table 5-4. There would be a reduction in interisland air carrier aircraft operations of about 1,600 in 2000, 2,900 in 2010 and 4,800 in 2020.

6.1.3 Kahului Airport

Based on the 1994 high range of passenger activity, the total number of passengers at Kahului Airport is estimated to increase from 5,182,510 passengers in 1992 to 10,617,000 passengers by 2020, an overall increase of 105 percent. It is assumed that Kahului Airport will receive international service by 2010 at the earliest. International passengers are forecast to increase from 571,000 in 2010 to 980,000 by 2020. This will increase the total overseas passengers at Kahului from 1,281,797 in 1992 to

3,839,000 by 2020.

Based on the 1994 low range of passenger activity, the total number of passengers at Kahului Airport is estimated to increase from 5,182,510 passengers in 1992 to 9,712,000 passengers by 2020, an overall increase of 87 percent. It is assumed that Kahului Airport will receive international service by 2010 at the earliest. International passengers are forecast to increase from 511,000 in 2010 to 870,000 by 2020. This will increase the total overseas passengers at Kahului from 1,281,797 in 1992 to 3,411,000 by 2020.

Scheduled international passenger service would add about 2,200 international air carrier operations in 2010 and 3,300 in 2020 compared to the Scenario One forecasts presented in Table 5-8. There would be a reduction in interisland air carrier operations of about 6,000 in 2010 and 9,700 in 2020.

6.1.4 Other Neighbor Island Airports

The passenger forecasts for the Hilo International, Lihue, Kapalua, Molokai, Lanai, Princeville, Hana, Kalaupapa and Waimea-Kohala Airports are the same for Scenario Two as for Scenario One and are as presented in Tables 4-1 and 4-2 in Section 4.0.

SECTION 7.0

PEAK PERIOD ACTIVITY FORECASTS

Peak period passenger and aircraft operation forecasts for the average day of the peak month have been prepared for the Honolulu International, Hilo International, Kahului, Keahole-Kona International and Lihue Airports. Peak day and peak hour aviation demand forecasts for enplaned passenger activity, airline activity, and aircraft operations are summarized for the individual airports. The peak period activity forecasts reflect information on peak period acivity presented in the latest Airport Master Plan prepared for each airport. These forecasts affect airfield, terminal area, access, automobile parking, and infrastructure requirements which must be planned for each airport. It should be noted that the peak periods for mainland, international and interisland passenger activity typically do not occur at the same time. The forecasts also assume that enplaned passengers and deplaned passengers are equal.

7.1 PASSENGER AND AIRLINE ACTIVITY

August is typically the busiest month for airline passenger activity in the State, with about 10 to 11 percent of the annual total. Because the peak month's share of the annual total has remained at about this level for many years, the forecasts for both overseas and interisland passenger volumes assume that 10 to 11 percent of the annual total passengers will continue to occur in the peak month through the year 2020 at the individual airports.

The percentage of the daily flights occurring during the peak hour varies by airport, depending upon the type and frequency of airline service and the aircraft used. Since these percentages have also generally been consistent over the years, the forecasts assume that the peak period will generally continue at these levels throughout the forecast period. Adjustments have been made for overseas service to the Neighbor Island airports to reflect increased overseas service during the forecast period. Because passenger load factors are typically higher during the peak hour than they are during the remainder of the day, the forecasts assume that the percentage of total daily passengers traveling during the peak hour will be greater than the percentage of flights occurring during the peak hour.

7.2 AIRCRAFT OPERATIONS

The peak day and peak hour operations forecasts for the average day of the peak month (ADPM) for total air carrier, commuter/air taxi, general aviation and military aircraft at each airport are presented. August is typically the busiest month for aircraft operations as well as for passenger activity. The peak month usually accounts for

about 9 to 10 percent of the total annual operations at the individual airports. The level of scheduled air carrier and commuter aircraft activity generally does not vary widely from month to month. However, the unscheduled air taxi and general aviation aircraft operations can vary significantly from month to month depending upon such factors as the weather conditions. The forecasts presented in this section assume that these relationships will continue through the year 2020 forecast period and that the average daily mix of aircraft operations by aircraft type is representative of the peak hour mix.

FAA Air Traffic Control Tower (ATCT) counts for the individual airports indicate that aircraft operations during the peak hour on an average day of the peak month account for approximately 8 to 15 percent of the total daily operations. The lower percentage occurs at Honolulu International Airport which has the highest volume of total aircraft operations. The forecasts assume that these relationships will continue through the year 2020 forecast period for the individual airports.

7.3 HONOLULU INTERNATIONAL AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-1 for enplaned and deplaned passengers and aircraft operations.

7.3.1 Passenger and Airline Activity

The peak month for airline passenger traffic at Honolulu International Airport typically accounts for 10 to 11 percent of the annual enplanements of both overseas and interisland passengers, based on the latest airport master plan prepared for Honolulu International Airport. The peak hour of a busy day accounts for about 15 percent of overseas and 13 percent of interisland daily enplanements.

On this basis, daily enplaned overseas mainland passengers are forecast to increase from 12,400 in 1992 to 19,400 in 2020, overseas international passengers to increase from 9,100 in 1992 to 22,000 in 2020 and interisland passengers are forecast to increase from 14,600 in 1992 to 25,000 in 2020. These peak period activity forecasts have been based on the average day of the peak month to be consistent with the latest airport master plans prepared for the airport.

However, for Honolulu International Airport and in particular for evaluating the international passenger arrival facilities, the State Department of Transportation is using the 20th highest day of the year concept based on an analysis of more detailed deplaned passenger data rather than the enplaned passenger data used for the ADPM projections. This results in a design day total passenger level approximately 15

Table 7-1

FORECAST OF PEAK PERIOD ACTIVITY
Honolulu International Airport
1992-2020

PEAK DAY FORECASTS	1992	2000	2005	2010	2015	2020
20TH HIGHEST DAY						
Passengers (Deplaned)						
Overseas						
- Mainland		17,321	18,814	20,138	21,291	22,269
- International		12,718	15,339	18,413	21,704	25,305
Interisland		19,365	21,994	24,339	26,637	28,803
Total		49,404	56,147	62,890	69,632	76,377
AVERAGE DAY PEAK MONTH (ADPM)						
Passengers (Enplaned)						
Overseas						
- Mainland	12,402	15,062	16,360	17,511	18,514	19,364
- International	9,053	11,059	13,410	16,011	18,873	22,004
Interisland	14,600	16,839	19,054	21,164	23,163	25,046
Total	36,055	42,960	48,824	54,686	60,550	66,414
Aircraft Operations						
Air carrier	588	586	638	682	727	766
Commuter/air taxi	170	192	212	233	244	257
General aviation	330	299	311	325	343	377
Military	83	70	68	64	64	64
Total	1,171	1,147	1,229	1,304	1,378	1,464

Table 7-1 – continued

PEAK HOUR FORECASTS	1992	2000	2005	2010	2015	2020
20TH HIGHEST DAY						
Passengers (Deplaned)						
Overseas						
- Mainland		3,811	4,139	4,430	4,684	4,899
- International		2,798	3,375	4,051	4,775	5,567
Interisland		2,324	2,639	2,921	3,196	3,456
Total		8,933	10,153	11,402	12,655	13,922
AVERAGE DAY PEAK MONTH (ADPM)						
Passengers (Enplaned)						
Overseas						
- Mainland	1,860	2,259	2,454	2,627	2,777	2,905
- International	1,366	1,659	2,012	2,402	2,831	3,301
Interisland	1,898	2,189	2,477	2,751	3,011	3,256
Total	5,124	6,107	6,943	7,780	8,619	9,462
Aircraft Operations						
Air carrier	47	47	51	55	58	61
Commuter/air taxi	14	15	17	19	20	21
General aviation	26	24	25	26	27	30
Military	7	6	5	5	5	5
Total	94	92	98	105	110	117

Source: Aries Consultants Ltd. and State of Hawaii Department of Transportation

percent greater than using the average day of the peak month approach. The different peak period forecasts are shown in Table 7-1. By 2020, the peak day deplaned passengers are estimated to total 76,376 passengers using the 20th highest day concept compared to 66,414 enplaned passengers using the average day of the peak month approach.

Based on recent deplaning passenger surveys conducted by the State Department of Transportation, the peak hour passenger levels using the 20th highest day concept are estimated to be 22 percent of the daily total for overseas mainland and international passengers and 12 percent for interisland passengers as shown in Table 7-1. This compares to about 15 percent for overseas mainland and international passengers and 12 percent for interisland passengers using the average day peak month approach for enplaning passengers.

By 2020, the peak hour deplaned passengers are estimated to total 13, 922 passengers using the 20th highest day concept compared to 9,462 enplaned passengers using the average day of the peak month approach. This difference seems to reflect more concentrated peak period activity for deplaning overseas mainland and international flights during the day than for the corresponding enplaning activity. The interisland enplaning and deplaning peak hour forecasts are similar using both forecasting methodologies.

7.3.2 Aircraft Operations

Forecasts of peak hour aircraft operations at the Airport were developed for air carrier, commuter/air taxi, general aviation, and military aircraft operations. Historical data, obtained from the FAA Air Traffic Control Tower at the Airport, indicates that the peak month percentages of annual operations and the peak hour percentages of operations during the average day of the peak month are approximately 9 percent and 8 percent respectively. It is assumed that these peak hour relationships will remain constant throughout the forecast period.

The total number of peak hour aircraft operations are forecast to increase from 94 in 1992 to 117 in the year 2020. The number of peak hour air carrier aircraft operations is forecast to increase from 47 operations in 1992 to 61 operations by 2020. Commuter/air taxi aircraft operations are projected to increase from 14 in 1992 to 21 by 2020. Peak hour general aviation aircraft operations are estimated to increase from 26 in 1992 to 30 operations by 2020. Peak hour military aircraft operations are forecast to remain at about 5 throughout the 2020 planning period.

7.4 HILO INTERNATIONAL AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-2 for enplaned passenger activity and aircraft operations.

7.4.1 Passenger and Airline Activity

The peak month share of annual interisland passenger enplanements has typically been 10 to 11 percent of the annual total. Therefore, for these forecasts it is assumed that 10 percent of total annual interisland passenger enplanements will occur in the peak month.

Approximately 20 percent of the interisland flights are scheduled during the peak hour. Hence, the peak hour forecasts conservatively assume that about 25 percent of the daily passenger total will occur during the peak hour throughout the forecast period.

Daily enplaned interisland passengers are forecast to increase from 2,700 in 1992 to 3,700 in 2020.

7.4.2 Aircraft Operations

FAA Air Traffic Control Tower records indicate that approximately 10 percent of total annual aircraft operations occur during the peak month. Daily FAA control tower counts at Hilo International Airport indicate that about 15 percent of the daily operations occur during the peak hour. The peak hour aircraft operation forecasts presented in Table 7-2 assume that these relationships will continue throughout the 2020 forecast period.

The total number of peak hour aircraft operations are forecast to increase from 44 in 1992 to 61 in the year 2020. The number of peak hour air carrier aircraft operations is forecast to increase from 10 operations in 1992 to 13 operations by 2020. Commuter/air taxi aircraft operations are projected to increase from 18 in 1992 to 22 by 2020. Peak hour general aviation aircraft operations are estimated to increase from 11 in 1992 to 17 operations by 2020. Peak hour military aircraft operations are forecast to remain at about 9 throughout the 2020 forecast period.

Table 7-2

FORECAST OF PEAK PERIOD ACTIVITY
Hilo International Airport
1992-2020

AVERAGE DAY PEAK MONTH (ADPM) FORECASTS	1992	2000	2005	2010	2015	2020
Passengers (Enplaned)						
Overseas						
-Mainland	0	0	0	0	0	0
Interisland	2,665	3,094	3,267	3,431	3,584	3,710
Total	2,665	3,094	3,267	3,431	3,584	3,719
Aircraft Operations						
Air carrier	69	80	84	86	87	89
Commuter/air taxi	120	127	133	139	143	147
General aviation	70	84	90	97	103	110
Military	35	63	62	62	62	62
Total	294	354	369	384	395	408
PEAK HOUR FORECASTS						
Passengers (Enplaned)						
Overseas						
-Mainland	0	0	0	0	0	0
Interisland	667	774	817	858	896	928
Total	667	774	817	858	896	928
Aircraft Operations						
Air carrier	10	12	13	13	13	13
Commuter/air taxi	18	19	20	21	21	22
General aviation	11	13	14	15	15	17
Military	5	9	9	9	9	9
Total	44	53	56	58	58	61

Source: Aries Consultants Ltd.

7.5 KEAHOLE-KONA INTERNATIONAL AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-3 for enplaned passengers and aircraft operations.

7.5.1 Passenger and Airline Activity

The peak month share of passenger enplanements is approximately 10 percent for interisland and 9 percent for overseas passengers. The peak hour of a busy day accounts for about 15 percent of the interisland passenger enplanements. For the forecasts, it is assumed that the peak month and peak hour relationships for interisland passenger traffic would remain constant through 2020. In 1992, there were only two daily overseas flights so the peak hour accounted for about half of the daily flights and passenger enplanements. It is expected that additional overseas departures would occur during the peak hour over time as overseas passengers and service increase. Therefore the overseas peak hour passengers have been forecast to decrease from 50 to 30 percent of the daily total by 2020.

Daily enplaned overseas mainland passengers are forecast to increase from 450 in 1992 to 2,000 in 2020 and interisland passengers are forecast to increase from 3,000 in 1992 to 4,000 in 2020.

7.5.2 Aircraft Operations

On the basis of FAA ATCT data for the Airport, the peak month percentages of annual operations and the peak hour percentages of total operations in the average day of the peak month are estimated to be about 9 percent and 10 percent respectively. It is assumed that these peak period relationships will remain constant through 2020.

The total number of peak hour aircraft operations are forecast to increase from 19 in 1992 to 27 in the year 2020. The peak hour air carrier aircraft operations are forecast to increase from 9 operations in 1992 to 10 operations by 2020. Commuter/air taxi aircraft operations are projected to increase from 3 in 1992 to 5 by 2020. Peak hour general aviation aircraft operations are estimated to increase from 6 in 1992 to 7 operations by 2020. Peak hour military aircraft operations are forecast to remain at about 4 throughout the 2020 forecast period.

Table 7-3

FORECAST OF PEAK PERIOD ACTIVITY
Keahole-Kona International Airport
1992-2020

AVERAGE DAY PEAK MONTH (ADPM) FORECASTS	1992	2000	2005	2010	2015	2020
Passengers (Enplaned)						
Overseas						
-Mainland	450	718	998	1,316	1,668	2,048
Interisland	3,037	3,563	3,716	3,847	3,060	4,048
Total	3,487	4,281	4,714	5,163	5,728	6,096
Aircraft Operations						
Air carrier	85	93	93	100	105	107
Commuter/air taxi	27	39	42	46	49	53
General aviation	61	58	61	64	67	70
Military	12	37	37	37	37	37
Total	185	227	233	247	258	267
PEAK HOUR FORECASTS						
Passengers (Enplaned)						
Overseas						
-Mainland	225	359	449	526	584	614
Interisland	456	534	557	577	594	607
Total	681	893	1,006	1,103	1,178	1,221
Aircraft Operations						
Air carrier	9	9	9	10	10	11
Commuter/air taxi	3	4	4	5	5	5
General aviation	6	6	6	6	7	7
Military	1	4	4	4	4	4
Total	19	23	23	25	26	27

Source: Aries Consultants Ltd.

7.6 LIHUE AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-4 for enplaned passenger activity and aircraft operations. The data for 1992 are lower than might be expected because of the effects of Hurricane Iniki in September 1992 on aviation activity.

7.6.1 Passenger and Airline Activity

The peak month share of interisland passenger enplanements is about 10 percent and for overseas passengers is about 11 percent. For the forecasts, it is assumed that 10 percent of the annual passenger enplanements for the year would be in the peak month for both interisland and overseas passenger traffic through 2020. Approximately 10 percent of the daily interisland flights occur during the peak hour. For purposes of this study, it is assumed that the peak hour passengers would account for about 15 percent of the daily passengers throughout the forecast period.

The forecasts assume that direct overseas passenger service will be reinstated during the forecast period and that the percentage of daily overseas flights during the peak hour will decrease over time.

Daily enplaned overseas mainland passengers are forecast to increase from 200 in 1992 to 1,100 in 2020 and interisland passengers are forecast to increase from 3,700 in 1992 to 5,000 in 2020.

7.6.2 Aircraft Operations

Based on a review of FAA ATCT data for the Airport, the aircraft operations in the peak month are approximately 10 percent of the annual operations. The peak hour aircraft operations represent about 13 percent of the total daily operations. It is assumed that this relationship will continue through the year 2020 forecast period.

The total number of peak hour aircraft operations is forecast to increase from 43 in 1992 to 65 in the year 2020. The peak hour air carrier aircraft operations are forecast to increase from 12 operations in 1992 to 16 operations by 2020. The commuter/air taxi aircraft operations are forecast to increase from 20 in 1992 to 41 by 2020. The peak hour general aviation aircraft operations are estimated to be about 5 operations between 2000 and 2020. Military aircraft operations are forecast to remain at about 3 operations during the peak hour through the year 2020.

Table 7-4

FORECAST OF PEAK PERIOD ACTIVITY
Lihue Airport
1992-2020

AVERAGE DAY PEAK MONTH (ADPM) FORECASTS	1992	2000	2005	2010	2015	2020
Passengers (Enplaned)						
Overseas						
-Mainland	225	394	550	724	917	1,127
Interisland	3,671	4,269	4,518	4,750	4,966	5,166
Total	3,896	4,663	5,068	5,474	5,883	6,293
Aircraft Operations						
Air carrier	95	107	111	115	120	124
Commuter/air taxi	156	238	258	278	298	318
General aviation	53	31	32	34	35	37
Military	30	26	26	26	26	26
Total	334	402	427	453	479	505
PEAK HOUR FORECASTS						
Passengers (Enplaned)						
Overseas						
-Mainland	225	196	275	326	367	394
Interisland	579	640	678	713	745	775
Total	804	836	953	1,039	1,112	1,169
Aircraft Operations						
Air carrier	12	14	14	15	16	16
Commuter/air taxi	20	31	34	36	39	41
General aviation	7	4	4	4	5	5
Military	4	3	3	3	3	3
Total	43	52	55	58	63	65

Source: Aries Consultants Ltd.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
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7.6 LIHUE AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-4 for enplaned passenger activity and aircraft operations. The data for 1992 are lower than might be expected because of the effects of Hurricane Iniki in September 1992 on aviation activity.

7.6.1 Passenger and Airline Activity

The peak month share of interisland passenger enplanements is about 10 percent and for overseas passengers is about 11 percent. For the forecasts, it is assumed that 10 percent of the annual passenger enplanements for the year would be in the peak month for both interisland and overseas passenger traffic through 2020. Approximately 10 percent of the daily interisland flights occur during the peak hour. For purposes of this study, it is assumed that the peak hour passengers would account for about 15 percent of the daily passengers throughout the forecast period.

The forecasts assume that direct overseas passenger service will be reinstated during the forecast period and that the percentage of daily overseas flights during the peak hour will decrease over time.

Daily enplaned overseas mainland passengers are forecast to increase from 200 in 1992 to 1,100 in 2020 and interisland passengers are forecast to increase from 3,700 in 1992 to 5,000 in 2020.

7.6.2 Aircraft Operations

Based on a review of FAA ATCT data for the Airport, the aircraft operations in the peak month are approximately 10 percent of the annual operations. The peak hour aircraft operations represent about 13 percent of the total daily operations. It is assumed that this relationship will continue through the year 2020 forecast period.

The total number of peak hour aircraft operations is forecast to increase from 43 in 1992 to 65 in the year 2020. The peak hour air carrier aircraft operations are forecast to increase from 12 operations in 1992 to 16 operations by 2020. The commuter/air taxi aircraft operations are forecast to increase from 20 in 1992 to 41 by 2020. The peak hour general aviation aircraft operations are estimated to be about 5 operations between 2000 and 2020. Military aircraft operations are forecast to remain at about 3 operations during the peak hour through the year 2020.

Table 7-4

FORECAST OF PEAK PERIOD ACTIVITY
Lihue Airport
1992-2020

AVERAGE DAY PEAK MONTH (ADPM) FORECASTS	1992	2000	2005	2010	2015	2020
Passengers (Enplaned)						
Overseas						
-Mainland	225	394	550	724	917	1,127
Interisland	3,671	4,269	4,518	4,750	4,966	5,166
Total	3,896	4,663	5,068	5,474	5,883	6,293
Aircraft Operations						
Air carrier	95	107	111	115	120	124
Commuter/air taxi	156	238	258	278	298	318
General aviation	53	31	32	34	35	37
Military	30	26	26	26	26	26
Total	334	402	427	453	479	505
PEAK HOUR FORECASTS						
Passengers (Enplaned)						
Overseas						
-Mainland	225	196	275	326	367	394
Interisland	579	640	678	713	745	775
Total	804	836	953	1,039	1,112	1,169
Aircraft Operations						
Air carrier	12	14	14	15	16	16
Commuter/air taxi	20	31	34	36	39	41
General aviation	7	4	4	4	5	5
Military	4	3	3	3	3	3
Total	43	52	55	58	63	65

Source: Aries Consultants Ltd.

7.7 KAHULUI AIRPORT

Forecasts of peak period aviation demand activity are presented in Table 7-5 for enplaned passenger activity and aircraft operations.

7.7.1 Passenger and Airline Activity

The peak month share for both overseas and interisland airline passenger traffic at Kahului Airport is about 10 percent of the annual total. The forecasts for both overseas and interisland passenger volumes assume that 10 percent of the annual total will continue to occur in the peak month through the year 2020. Approximately 10 percent of the daily interisland flights occur during the peak hour and the forecasts assume this will continue throughout the forecast period. Because passenger load factors are higher during the peak hour than they are during the remainder of the day, the forecasts assume that about 15 percent of total daily interisland passengers will travel during the busiest hour. Currently, approximately 20 percent of the daily overseas flights occur during the peak hour. This percentage is forecast to decrease to about 15 percent by the year 2020 as the number of overseas flights increase.

Daily enplaned overseas mainland passengers are forecast to increase from 2,100 in 1992 to 4,100 in 2020 and interisland passengers are forecast to increase from 6,300 in 1992 to 11,600 in 2020.

7.7.2 Aircraft Operations

FAA ATCT data indicate that the peak month for aircraft operations typically has about 10 percent of the total annual operations and the busiest hour of the average day of the peak month accounts for approximately 11 percent of the total daily operations. The forecasts assume that these relationships will continue through the year 2020 forecast period.

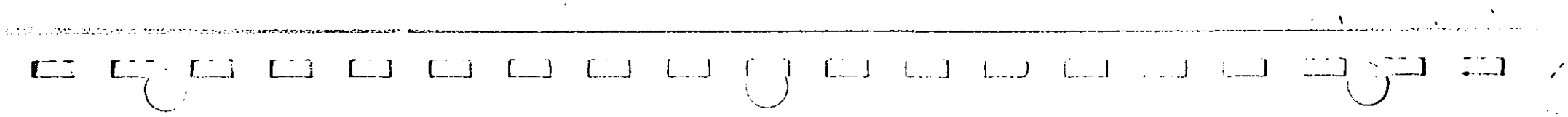
The total number of peak hour aircraft operations is forecast to increase from 63 in 1992 to 106 in the year 2020. The peak hour air carrier aircraft operations are forecast to increase from 20 operations in 1992 to 33 operations by the year 2020. Commuter/air taxi operations are forecast to increase from 24 operations in 1992 to 48 operations by the year 2020. The peak hour general aviation aircraft operations are estimated to increase from 17 in 1992 to 21 operations by the year 2020. Military aircraft operations are forecast to remain at about 4 operations during the peak hour through 2020.

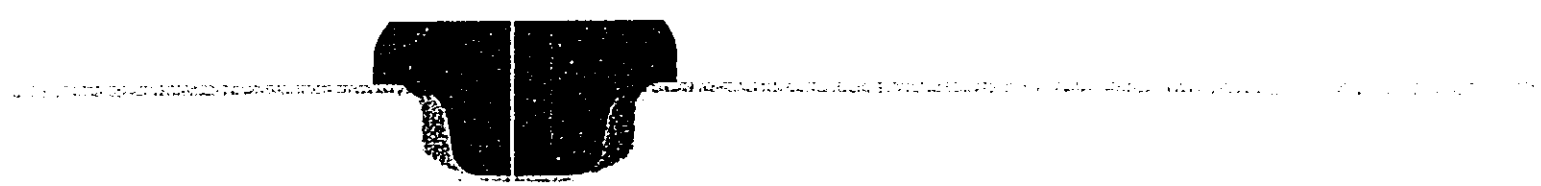
Table 7-5

FORECAST OF PEAK PERIOD ACTIVITY
Kahului Airport
1992-2020

AVERAGE DAY PEAK MONTH (ADPM) FORECASTS	1992	2000	2005	2010	2015	2020
Passengers (Enplaned)						
Overseas						
-Mainland	2,067	2,511	2,897	3,292	3,694	4,098
Interisland	6,297	7,652	8,619	9,592	10,574	11,566
Total	8,364	10,163	11,516	12,884	14,268	15,664
Aircraft Operations						
Air carrier	184	216	236	260	280	300
Commuter/air taxi	222	290	326	362	398	434
General aviation	153	132	145	158	171	187
Military	18	39	38	38	38	38
Total	577	677	745	818	887	959
PEAK HOUR FORECASTS						
Passengers (Enplaned)						
Overseas						
-Mainland	413	477	521	560	591	615
Interisland	944	1,148	1,293	1,439	1,586	1,735
Total	1,357	1,625	1,814	1,999	2,177	2,350
Aircraft Operations						
Air carrier	20	24	26	29	31	33
Commuter/air taxi	24	32	36	40	44	48
General aviation	17	15	16	17	19	21
Military	2	4	4	4	4	4
Total	63	75	82	90	98	106

Source: Aries Consultants Ltd.





APPENDIX T

ADDITIONAL ARCHAEOLOGICAL AND HISTORICAL REPORTS

CORRECTION

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APPENDIX T

ADDITIONAL ARCHAEOLOGICAL AND HISTORICAL REPORTS

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ADDITIONAL ARCHAEOLOGICAL AND HISTORICAL REPORTS

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PRESERVATION PLAN:
SITE 1798, KAHULUI AIRPORT, ISLAND OF MAUI

by

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July 1997

EXECUTIVE SUMMARY

A preservation plan for Site 1798 at Kahului Airport on the island of Maui has been prepared as part of the documentation related to preparation of an Environmental Impact Statement (EIS) for the airport. The preservation plan originates from three sources: a 1994 assessment of cultural resources at Kahului Airport (Tomonari-Tuggle and Welch 1994); a 1996 draft EIS for the airport; and subsequent reviews of both the assessment and the draft EIS by the State Historic Preservation Division and the Maui/Lana'i Island Burial Council.

The preservation plan describes Site 1798 and proposes preservation recommendations addressing boundaries of the preservation area, design of physical preservation measures (e.g., fencing, berms, and setbacks), long-term maintenance and security, and procedures for future access (if necessary). It also establishes the need for monitoring of construction activities in the vicinity of the preservation area.

INTRODUCTION

At the request of Edward K. Noda and Associates, International Archaeological Research Institute, Inc. (IARII) has prepared a preservation plan for Site 50-50-05-1798, located at Kahului Airport on the north coast of the island of Maui (Fig. 1). The site consists of a burial area identified during airport construction in the mid-1970s, a nearby reinterment area for the human remains uncovered at that time, and a buried cultural deposit exposed during archaeological investigations in 1991. The proposed preservation area for Site 1798 covers approximately 5.5 acres and is defined by the airport perimeter fence on the north and Runway 5-23 and the Runway 2-20 taxiway on the south; the east boundary is a setback of a minimum of 100 feet and the west boundary is a setback of a minimum 200 feet from the burial and reburial locales (Fig. 2). The purpose of the preservation plan is to ensure the long-term protection of Site 1798 within the context of accommodating airport security and aircraft safety needs.

The preservation plan originates from three sources: an assessment of cultural resources at Kahului Airport (Tomonari-Tuggle and Welch 1994), a draft environmental impact statement (EIS) for Kahului Airport (1996), and subsequent reviews of the assessment and draft EIS by the State Historic Preservation Division (SHPD). This final preservation plan also responds to the review of a draft preservation plan by the SHPD and the Maui/Lana'i Island Burial Council.

The 1994 cultural resource assessment was carried out as part of the overall preparation of the Kahului Airport EIS, based on an Airport Master Plan developed by Belt Collins and Associates (1993). The EIS is being jointly prepared by the Federal Aviation Administration (FAA) and the State of Hawai'i Department of Transportation, Airports Division, in accordance with the requirements of the National Environmental Policy Act of 1969, as amended, and Chapter 343, HRS, as revised.

Activities at Kahului Airport must comply with Hawai'i Revised Statutes Section 6E concerning protection of Native Hawaiian burial sites and human remains, the rules for which (Title 13, Subtitle 13, Chapter 300) were established in September 1996. Also, since some of the funding for airport improvements is provided by the FAA, the proposed project meets the definition of an undertaking, as defined by Section 106 of the National Historic Preservation Act (NHPA) and is subject to NHPA rules and regulations.

DESCRIPTION OF SITE 1798

Site 1798 consists of three localities: a main burial locale that was exposed by construction activities in the mid-1970s (Area 1B); a reburial area for human remains that were disturbed by that activity (Area 1A); and subsurface prehistoric cultural deposits, including a buried wall associated with a marsh or pondfield type deposit (Welch 1991:58).

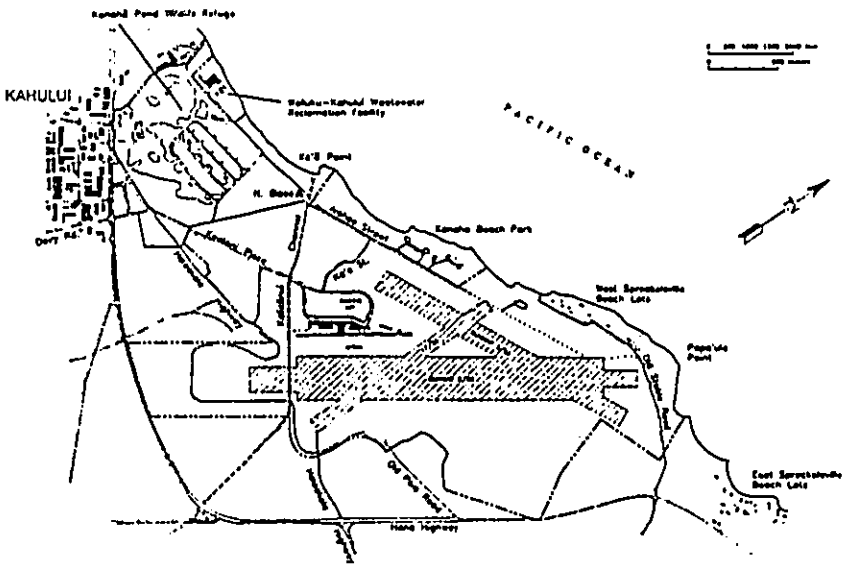

Figure 1. Kahului Airport, Island of Maui.

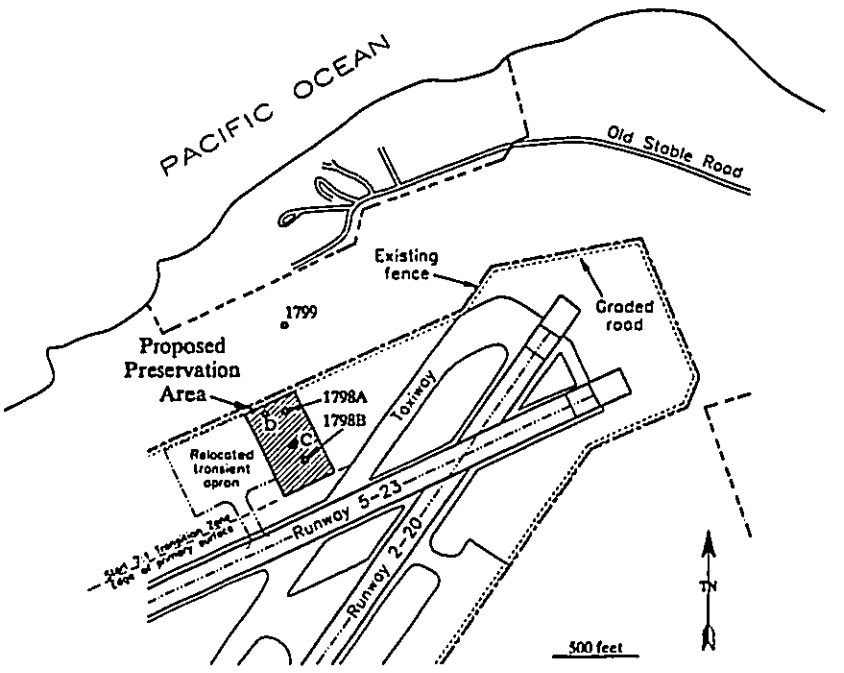

Figure 2. Site 1798 Preservation Area at Kahului Airport. 1798A = Reburial Area, 1798B = Burial Area, C = Buried Wall, D= Second Possible Reburial Area. (Revised August 1997)

The site may be on the edge of a remnant sand dune that has been obscured by construction of Runways 5-23 and 2-20. Aerial photographs taken of Naval Air Station Kahului in 1944 (curated at the National Archives) indicate that the burial area was slightly higher than surrounding areas and, unlike surrounding areas, was left relatively undisturbed during airfield construction, with pre-construction vegetation still growing in the area. Site 1799, a site consisting of a possible rock alignment, a remnant coral paving, and a grinding stone, is located on the edge of a sand dune 365 feet north of Area 1A (Fig. 3).

Site 1798 was first documented by Robert Connolly in 1981. During a surface archaeological survey of the airport area, he was told by airport superintendent Thomas F. Hanchatt that burials had been discovered several years previously (approximately 1975) when a section of the airport was being graded and grubbed (Connolly 1981:67):

> Upon finding the burials, work was stopped. Mr. Charles Maxwell was brought in to bless and rebury the bones off to the side of the construction area. Other, undisturbed burials were left in place, and to prevent any further disturbance of them large boulders were pushed around the site by the contractor. Mr. Maxwell was quoted as indicating at the time that these were the bones of warriors who had fallen during a prehistoric battle and were buried where they fell.

The reburial area was designated Site 1A and the intact burials constituted Site 1B (Connolly 1981).

In a survey several years later, Welch (1988:5) reported that the area was heavily overgrown and that he could not relocate the burial and reburial sites except with the assistance of Mr. Hanchatt. Mr. Hanchatt took him:

> ...directly to the place where the burials had been encountered during grading and grubbing of the area north of runway 5-23...Large basalt boulders are still present on the surface where they were pushed by the bulldozers to surround and protect the burial area. The area is now heavily overgrown with *koa haole* and grasses, and many of the boulders are no longer visible. The site area consists of two mounds which are probably the remnants of what was a more extensive sand dune ridge prior to construction of the airport.
>
> The reburial site was also pointed out by Tom Hanchatt and is located approximately 250 ft north of the north edge of the original burial area and 110 ft south of the perimeter security fence. Basalt boulders had been placed around the reburial location. The burial pit apparently was not sufficiently filled and there is now a surface depression at the burial location.

The burial and reburial locations, which were designated State Site 50-50-05-1798, were surveyed by R.T. Tanaka Engineers, Inc. to a benchmark at the northeast end of Runway 2-20 (see Fig. 3). Welch (1988) recommended that the burial and reburial areas be preserved, with a 50 foot buffer around the burial area and a 30 foot buffer around the reburial area.

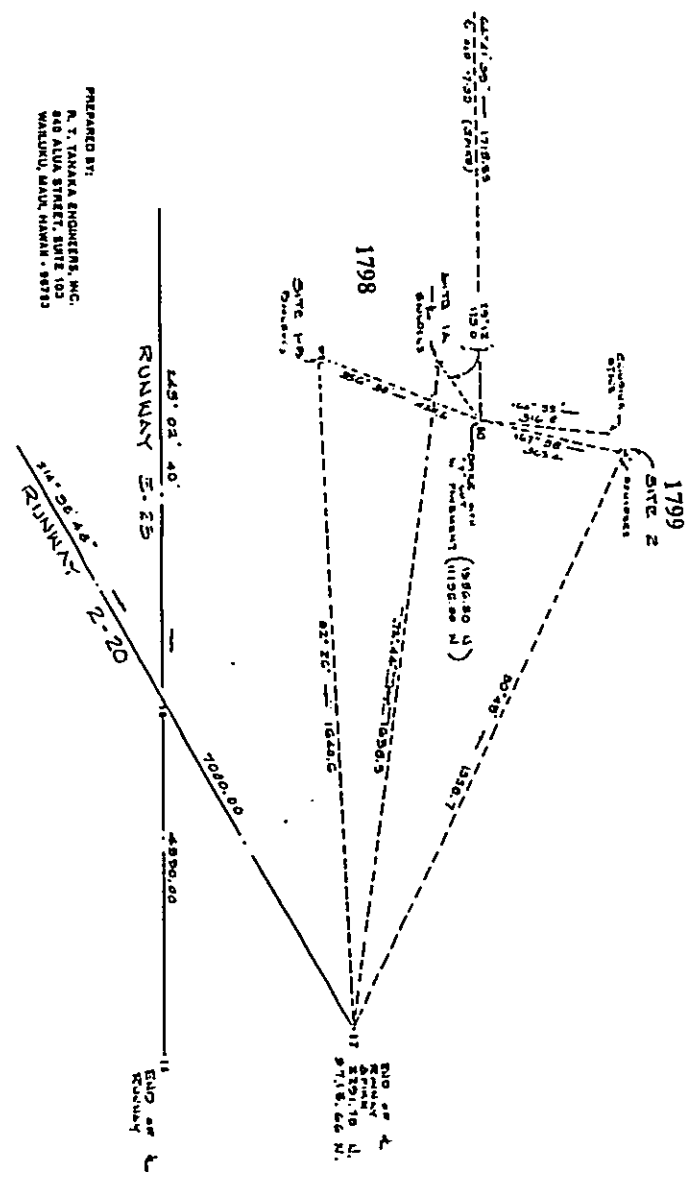

Figure 3. Surveyed Locations of Site 1798, Re-Burial Area 1A and Burial Area 1B, and Site 1799.

Welch (1991) revisited the site three years later. Four backhoe trenches were dug in the Site 1798 area; one trench revealed a buried wall and marsh-type deposits near the burials. Other trenches to the west of the burials showed evidence of construction fill almost to the water table. Welch also spoke with local airport employees about airport development during World War II. He was told that the U.S. Navy brought in fill material from a volcanic cone near Pā'ia which was the location of a Japanese cemetery. Although the Navy gave notice of the project, apparently not all of the burials at the cemetery were moved before the transfer of fill began. Welch (1991:52) notes:

> Thus the fill placed beneath the runways contained some human bones derived from this early twentieth century cemetery. This raises the question of whether the bones found during the bulldozing in the area of Site 1798 are those of prehistoric Hawaiians or historic Japanese immigrants.

At recent meetings with the Maui/Lana'i Island Burial Council (see below), Charles Maxwell clarified that the human remains that were recovered in the mid-1970s were articulated. This is strong evidence for an *in situ*, intact interment; that is, the remains would not be articulated if they had been brought in as part of the imported runway fill. This suggests that the burials are probably native Hawaiian.

The burials were neither osteologically nor archaeologically examined to determine ethnicity or other characteristics. However, whether they are of Hawaiian or Japanese origin, they are nonetheless significant for their cultural value to either ethnic group (according to State of Hawai'i cultural resource significance criterion E). In addition, the possible buried wall and marsh/pondfield soils are significant for their information content, as the site has research potential and may contribute to a better understanding of Hawaiian prehistory (National Register of Historic Places significance criterion D).

BACKGROUND TO THE PRESERVATION PLAN

In 1994, a cultural resources assessment for the airport related to the preparation of the above referenced EIS (Tomonari-Tuggle and Welch 1994) concurred with Welch's recommendations (1988, 1991) for preservation as is. This recommendation was subsequently incorporated into the 1996 draft EIS.

The State Historic Preservation Division (SHPD) responded to the draft EIS (letter to David J. Welhouse, FAA, dated May 21, 1996; see Appendix A) by suggesting that proposed Phase I strengthening of Runway 2-20, which is just east and southeast of Site 1798, and a Phase III plan to develop a transient aircraft parking apron in the immediate area could adversely affect the site. The SHPD indicated the need for [1] determining the full extent of burials and human skeletal remains in the area, [2] developing a preservation plan, [3] petitioning the Maui/Lana'i Island Burial Council for a determination to preserve remains in place or to relocate the remains, and [4] having the preservation plan approved by the SHPD Burial Sites Program. Further, the SHPD disagreed with the description of Site 1798 in the draft EIS as a "disturbed burial area," with proposed treatments to "avoid or data recovery and institute burial plan" (it should be clarified that the data recovery recommendation was directed to the buried wall and marsh deposit, and not to the burials).

A field visit and meeting with the SHPD Maui Island archaeologist and members of the Island Burial Council was held on June 21, 1996, to provide the Burial Council with general background information concerning the site and the actions proposed in the draft EIS, and to solicit input on appropriate burial treatment. Unfortunately, the burial and reburial sites could not be relocated due to heavy vegetation that obscured earlier landmarks.

A second field visit by IARII and EKNA on July 11 resulted in the relocation of the burial site. A location to the west of the reburial site identified by Tom Hanchatt contained an arrangement of three large boulders that seemed to match better previous descriptions of the reburial locale. However this location (marked D on Fig. 2) was slightly to the west of the location indicated by Mr. Hanchatt. His reburial site could still not be found beneath the thick vegetation. Subsequently surveyors from R.T. Tanaka Engineers, Inc. relocated the exact site locations of both the 1B burial area and the 1A reburial area based on Tom Hanchatt's locations using the earlier Tanaka transit data (see Fig. 3), as well as the new potential burial area found during the July 11 site visit. These areas were partially cleared by Airport maintenance personnel.

A second field visit with the SHPD Maui Island archaeologist and members of the Island Burial Council was scheduled for October 16, 1996. During this visit, discussions with Mr. Maxwell clarified that he had not seen the reburial area after blessing the bones and therefore was not certain of the final condition in which the area was left. The visit to the alternative reburial area led to the conclusion that this was not the reburial area; it was, according to Mr. Maxwell, too close to the north perimeter fence, and a stone feature surrounded by the boulders appeared more likely to have been used as a hearth than to have been meant as a burial marker. The reburial area identified by Hanchatt was also visited, but little can be seen today of the boulder arrangement, already quite obscure in 1988, that was supposed to mark the reburial locale.

Airport staff and EKNA planners explained the nature of the runway strengthening project, in that this action would involve removal of only the upper layers of the existing runway pavement; no subsurface grading or excavation would be required. The SHPD archaeologist agreed that such action was not likely to adversely impact the site. Relocation or reduction in size of the proposed transient aircraft parking apron was also proposed. General statements regarding burial treatment were discussed at both meetings.

PROPOSED PRESERVATION AREA

Figure 2 shows the proposed preservation area. It is defined by the airport perimeter fence on the north and by Runway 5-23 and the Runway 2-20 taxiway on the south. Setbacks from the burial/reburial localities shall be 200 ft to the west boundary and 100 feet to the east

boundary (the lesser setback on the east side is due to the fact that the area to the east will not be developed).

The intent of the preservation plan is to provide for the long-term protection and preservation of Site 1798. However, it is clear from the previous archaeological work (Welch 1988, 1991) and the recent field visits that what is known of the site is based largely on oral historical rather than archaeological data. That is, there is little physical data about the extent of the burials, their location (except for the transit data which is based on Mr. Hanchatt's memory of the site), and the ethnicity of the individuals (although the probable ethnicity is native Hawaiian). And at present, there are no resources to carry out a full, systematic excavation to retrieve these data.

Therefore, it is recommended that the entire area, as shown in Figure 2 above, be delineated as a preserve. This, in effect, expands Welch's 1988 recommendations for buffers around each of the two burial localities into one cohesive preservation area with a minimum 100 ft setback from the delineated burials/reburials (200 ft on the western side). This will expediently ensure long-term preservation of the site in the absence of data concerning the full site extent (i.e., whether there are other as yet unidentified burials in the area).

As further protection, an additional 400 foot transitional buffer zone around the preserve is proposed. Any ground-disturbing activities within this transitional zone will require monitoring by a professional archaeologist.

POTENTIAL IMPACTS ON PRESERVATION AREA

There should be no impact on the preservation area from the proposed Phase I project to strengthen and repave Runway 2-20. This project will involve the removal and replacement of only the upper portion of the existing runway surface; there should be no subsurface disturbance outside of the existing paved areas. However, there may be some subsidiary disturbance if heavy machinery is driven off the paved surface (e.g., to turn around, or in backing).

A Phase III project to develop a transient aircraft parking apron in the immediate vicinity of the preservation area will be relocated or reduced in size.

Future activities that may affect the integrity of the preservation area include vegetation clearance to maintain aircraft visibility, maintenance of the grass areas adjoining the runways, and runway drainage operations, particularly on the east side of the preserve.

PRESERVATION RECOMMENDATIONS

The roughly rectangular area shown in Figure 2 is recommended as the burial preservation area. No future development within this area should be allowed. Only activities as required for aircraft safety and airport maintenance should be permitted.

The preservation area boundaries should be clearly indicated on relevant planning maps for the airport, including the final EIS and Airport Layout Plan.

PHYSICAL PRESERVATION MEASURES

Along the north boundary, all access points into the preservation area from along the road (on the south side of the airport perimeter fence) should be permanently blocked off by fencing or placement of large boulders. Chain-link or similar security fencing should be placed along the west and east boundaries. One point of access from either the north or west sides should be maintained by a secured gate. The present vegetation along the runways, combined with the runways themselves, are sufficient preservation barriers along the south side of the preserve area.

Within the larger preservation area, the delineated burial and reburial areas should be marked with strand wire fencing to ensure that the specific burial/reburial areas are not disturbed. Some type of physical marking, following recommendations by the Maui/Lana'i Island Burial Council, should be placed at the reburial area to better mark the location and replace the now obscure surrounding boulders. As recommended by Welch (1991), a 50 foot buffer should be established around the burial area and a 30 foot buffer around the reburial area.

An earthen berm should be constructed around the perimeter of the preservation area or earthen berms constructed around the burial and reburial areas slightly beyond the 30 foot and 50 foot buffer zones in order to prevent the runoff of water and pollutants into the site. Berm construction should not involve any subsurface excavation within the preservation area.

This preservation area falls within an Air Operations Area that requires adherence to FAA and State Department of Transportation (HDOT) rules and regulations.

ACCESS

Public access to the preservation area should be provided to recognized lineal and cultural descendants and to the Maui/Lana'i Island Burial Council (or its representatives) for the purposes of cultural practices, or for airport safety and/or maintenance purposes. Because the preservation area falls within the Air Operations Area, all access will require clearance through and coordination with the Maui Airport District Manager; site visits will require HDOT escorts.

MAINTENANCE

Long-term maintenance should be the responsibility of the airport management. No ground-disturbing activities (e.g., grading or grubbing) should be allowed within the preservation area. Vegetation clearance can be carried out along the perimeter of the larger preservation area only, or as required for aircraft safety. All clearing is to be done by hand or by non-ground-disturbing mechanisms.

MONITORING

To ensure that the burials are preserved in perpetuity, periodic monitoring of the preservation area should be carried out. The purpose of the monitoring is to review and assess conditions to ensure that the burial and reburial areas (as well as the buried cultural deposits) have not been inadvertently disturbed. It is recommended that periodic monitoring be carried out by appropriate representatives of HDOT-Airport Division, State Historic Preservation Division, and the Maui/Lana'i Island Burial Council. Since the preservation area falls within the Air Operations Area, all FAA and HDOT-Airport Division rules and regulations must be adhered to. Advance notice of site visits will be required; site visits will require coordination with and escort by HDOT-Airport Division, Maui District.

MONITORING DURING CONSTRUCTION IN ADJACENT AREAS

Prior to any construction in adjacent areas, the preserve boundaries should be clearly marked by flagging tape. A pre-construction briefing with construction field management should be held to ensure that all parties that will be working in the vicinity of the preserve are aware of the sensitive nature of the area. All construction activities involving excavation within 400 ft of the preservation area should be monitored by a professional archaeologist to ensure that construction activities do not encroach into the preserve and to be available in the event that additional burials are uncovered.

If additional burials are uncovered during construction, work in the immediate area will stop (although it may resume at another location) and the SHPD will be immediately notified, thereby beginning the consultation process that will be conducted in accordance with the provisions of HRS Chapter 6E-43.

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APPENDIX

STATE HISTORIC PRESERVATION DIVISION
SECTION 106 REVIEW

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

May 21, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

LOG NO: 17538
DOC NO: 9605KD27

Dear Mr. Welhouse:

SUBJECT: National Historic Preservation Act, Section 106 Review of the Draft Environmental Impact Statement - Kahului Airport Improvements Project, Kahului, Wailuku District, Island of Maui TMK: 3-8-01

The Draft Environmental Impact Statement (DEIS) for the Kahului Airport improvements project covers an area of approximately 1,447 acres and addresses impacts for twenty-five proposed construction/improvement projects that are to occur in three phases. In order to address the impacts of these projects to historic and archaeological sites, an assessment report was prepared and attached to the DEIS as Appendix H (*The Archaeology of Kahului Airport*, M.J. Tomonari-Tuggle and D.J. Welch 1995).

The assessment report summarizes previous land use in and around the airport area, and summarizes the findings of previous archaeological studies. The assessment also includes new information regarding the Naval Air Station, Kahului (NASKA; SIHP Site 50-50-05-4197). The recommendations for "no adverse effect" are organized in the assessment by airport subarea (i.e., airport proper, coastal strip, cane fields, developed lands to the west, and Kanaha Pond). Specific recommendations are also provided for previously identified historic sites.

We would like to first comment on the potential impacts and recommended treatments for the known historic sites. Second, we will comment on recommended additional inventory surveys of previously unsurveyed areas within the project. Third, we wish to point out some inconsistencies between the text of the assessment report (Appendix H) and the text of the DEIS regarding site assessments and recommended actions (Pages 2-82-87). Finally, we will summarize additional archaeological work that is recommended prior to the completion of the Final EIS for this project.

RECEIVED
MAY 30 1996
EDWARD K. NODA & ASSOCIATES

Known Historic Sites

Prior archaeological surveys within portions of the airport have identified five historic sites. SIHP Site 50-50-05-1777 is a buried cultural deposit which includes intact features, midden deposits and numerous artifacts. The site has been dated to circa AD 1380-1700. Site 1777 is located within the area slated for Phase 2 land acquisition at the east end of a proposed parallel runway. The site was identified during monitoring of a sewer trench excavation that was not related to airport improvements. The area around Site 1777 was not included in previous inventory surveys that have been conducted for airport projects. The assessment report notes that our office has previously indicated that this area will require subsurface testing prior to grubbing, grading, or construction in this area. Data recovery work at Site 1777 will also be needed. We will not know the full extent of cultural resources in this area until the subsurface survey work is completed. The EIS should therefore state that the DOT cannot address potential impacts to historic sites in this area until further archaeological work is completed.

SIHP Site 50-50-05-1798 consists of an unknown number of human burials, a reburial area, and a subsurface terrace wall with associated pondfield deposits. The full extent of Site 1798 is not known; it was first identified during grading for runway construction in 1975. At that time, human skeletal remains were disturbed and exposed. Some of the remains were preserved in place, others were reburied nearby. It is possible that the site extends beneath runways 5/23 and 5/20; no survey was conducted of this area prior to runway construction.

Additional subsurface testing and data recovery is recommended in the assessment report for the pondfield and wall feature within Site 1798. We concur with this recommendation, and also recommend that additional testing also be conducted in order to determine more accurately the extent of burials and human skeletal remains at this site.

The assessment report recommends preservation "as is" for the known burials at Site 1798, with the placement of a 50 foot buffer zone around the *in situ* burials and a 30 foot buffer around the reburial area. The proposed burial treatment/preservation plan as presented in the assessment report will need to be reviewed by the State Historic Preservation Division Burial Sites Program, and if the burials are Hawaiian, the Maui/Lana'i Island Burial Council will make the determination as to whether they are to be preserved in place or relocated (HRS 6E). The Department of Transportation should request Council determination prior to the finalization of the EIS, as the final disposition of this site may affect the placement of proposed structures and facilities. The additional archaeological testing to determine the extent of the burials should be conducted prior to Council determination.

The known features of Site 1798 are located at the site of a proposed transient aircraft parking apron and additional air cargo facilities, to be constructed during Phase 2 improvements. It should also be noted that the proposed strengthening and repaving of Runway 2-20 (Phase 1) could potentially have an adverse effect on unidentified burials associated with Site 1798. This potential impact is not discussed in the assessment report or in the DEIS. Moreover, Welch (1991, Appendix H) reports that fill material used by the military in this area of the airport contained human skeletal material. If this is correct, then there will need to be a plan in place for recovering these remains when the existing runway pavement is removed.

SIHP Site 50-50-05-1799 is a 4.0 m long alignment and possible coral paving of unknown function, located north of Site 1798. This site appears to be within the impact zone for a proposed perimeter road and fencing, which is included as part of the Phase 2/3 improvements. A full assessment of this site is not possible based on currently available information. The assessment report recommends that additional archaeological work is needed here if construction activities are to occur within the immediate site area. We recommend that testing is needed to determine the function of the site as part of the planning process.

SIHP Site 50-50-05-2849 consists of an extensive subsurface cultural deposit that was identified in ten backhoe trenches excavated during a prior testing project for the airport (Toenjes et al. 1991). The site will be impacted by the proposed perimeter road and fencing, and by widening of the runway safety areas. The assessment report recommends that data recovery work including both backhoe trenching and hand excavation be conducted at this site prior to the initiation of earth disturbance in the area. We concur with this recommendation. Information obtained during inventory survey at this site indicates that it is significant for information content. Based on current information, data recovery of impacted areas will permit a "no adverse effect" determination for this site.

SIHP Site 50-50-05-4197 consists of numerous structures, cement pads, roadways, aircraft, surface artifacts, and adjunct features which comprise the Naval Air Station. The assessment report provides preliminary information for a number of these buildings, and indicates that there are available documents and maps to aid in the identification of various features. A more detailed inventory and assessment of this site is needed for the Final EIS. There appear to be some structures within this site that may be architecturally significant. The assessment report recommends that a sample of the structural foundations should be recorded in detail by an architectural historian as part of the data recovery work. We believe that an inventory survey of the site should be conducted, with site assessments by an architectural historian, in order to determine whether selected buildings should be preserved. At this time, we do not have sufficient information to determine the extent, nature, and location of data recovery work that is needed for this site.

Kanaha Pond (SIHP Site 50-50-05-1783) is within the airport project areas boundaries, however, no improvements are proposed for the pond area. We recommend that this historic fishpond remain as a preserve, and that no construction work occur within or adjacent to its boundaries. The site is significant under all four National Register Criteria, and is also significant under HRHP criterion E, as having traditional cultural value.

Areas Not Previously Surveyed

The archaeological assessment report recommends that subsurface inventory survey work should be conducted of all areas within the existing airport grounds that have been filled (as opposed to cut). We concur with this recommendation. These areas occur along both sides of runways 5/23 and 2/20, and the area west of runway 17/35. In addition, all structural remains and other components of the Naval Air Station within the airport grounds should be recorded, and locations accurately plotted in order to determine whether they will be impacted by the proposed projects. The significance of the structures will need to be assessed, and mitigation measures recommended.

The area of cane fields to the east and southwest of the existing airport will be impacted by Phase I infrastructure improvements and runway 2/20 extension. The assessment report and early twentieth century maps of the area indicates that four plantation camps were once present in these areas (Middle Village I, Lower Village I, Japanese Village I and Russian Village). There is a potential for subsurface features to be present in the area of these villages, beneath the disturbed plowzone. We concur with the recommendation that subsurface inventory survey work occur in the areas of the plantation camps. The testing should occur prior to completion of the final EIS, in order to provide information on the presence/absence of potentially significant sites that may be impacted by Phase I improvements.

The area to the west of the airport, between Kanaha Pond and Kalialinui Gulch will be impacted by an underground fuel pipeline, construction of fuel storage tanks, and expanded transportation facilities. The assessment report recommends that subsurface testing and sediment coring be conducted for proposed projects in this area. We concur with this recommendation. The fuel pipeline is listed in the DEIS as Phase 2/3 project. Inventory level recording and National Register evaluations will also be needed for the NASKA (Site 4187) features within this area.

The assessment report indicates that inventory survey work has been conducted of areas to the northeast and southeast of Kanaha Beach Park, and at the mouth of Kalialinui Stream. No archaeological work has been conducted to date within Kanaha Park. The DEIS indicates that improvements to Kanaha Park are to occur as part of the airport improvement project. The location of the park improvement area as shown on Figure 2-12 is within a previously surveyed and tested area. If the improvements remain in this area, they will have "no effect" on historic sites. If, however, improvements occur within the existing park area, impacts to unidentified sites could occur. Any areas to be impacted by park improvements within the park proper will need to have archaeological inventory work completed prior to initiation of earthmoving or vegetation grubbing.

The Draft EIS

It is stated on page 3-82 of the DEIS that the NASKA structures "...contain no special architectural features and are not considered architecturally significant." This statement is repeated on page 3-87. In contrast, the assessment report (Appendix H) clearly states that:

> The standing structures and foundations should be considered potentially significant and eligible for the National Register. Buildings 101, 244 and the remaining foundation of Building 411 should be considered for preservation. (Appendix H, page 57)

Site 4187 is significant under NRHP Criteria A and D, and certain structures are potentially significant as excellent examples of an architectural style and period (Criterion C). The EIS text should be modified to more accurately reflect this finding. As indicated above, additional inventory and assessment work is needed at this site for Final EIS preparation.

Table 3-36 of the DEIS describes a portion of Site 1798 as a "disturbed burial area"; proposed treatments are "avoid or data recovery and institute burial plan". It should be clarified that Site 1798 contains known *in situ* burials that were preserved in place, and are described in the assessment report as "undisturbed burials". The proposed treatment for this site should follow the procedure outlined above,

which is mandated by HRS Chapter 6E. This includes the following steps: 1) determine the extent of the burials, 2) develop a burial treatment plan, 3) petition the Maui/Lana'i Islands Burial Council for a determination to preserve in place or relocate, 4) and have the burial treatment plan approved by the State Historic Preservation Division Burial Sites Program. Data recovery would occur only if the Council determines that the burials should be relocated.

Regarding project impacts, it is stated on page 3-86 of the DEIS:

> Based on the archaeological surveys and determination analyses performed for this EIS, and based on evaluation criteria listed above, the Runway 2-20 extension and the other Proposed Projects in Phase 1 will not have significant impacts on the archaeological, cultural and historical features.

We cannot fully concur with this conclusion at this time. As stated above, the construction work associated with strengthening Runway 2-20 could adversely affect Site 1798. Additional subsurface testing is needed in this area to determine the extent of the burial site. Other phase 1 work, such as improvements to infrastructure (roadways and utilities) could also impact historic sites. The specific location of these improvements is difficult to ascertain from available maps and text.

Table 3-37 (page 3-86) of the DEIS has the headings in the wrong order. The heading "Significance Criteria" should be over the first column; the heading "Potential Effect Issue Area" should be over the second column. We do not agree with the table for Criteria A and C, which has "Insignificant (none)" and "Not Applicable" entered in the third column. Both of these criteria may be applicable to the NASKA, as well as other sites that may be present within unsurveyed areas. It is premature to make these kinds of conclusions regarding project impacts; the full significance of sites in the project area has not been determined.

Regarding mitigation measures, the DEIS states that "additional data recovery and recording will be performed for all sites..."(page 3-87). Prior to the initiation of data recovery, inventory level work is needed for NASKA (Site 4197), for Site 1777 and immediate area, for Site 1798 and immediate area and for Site 1799. Data recovery level work may proceed at Site 2849. Suitable mitigation measures for the other four sites cannot be determined until the inventory level work is completed. In some cases, data recovery may not be the appropriate mitigation measure.

The DEIS states on page 1-5 that the 1991 Court-ordered stipulation required the EIS to address projects described in the Long-Term Development Plan; however, it is stated on page 3-86-87 that impacts of the Phase 3 improvements will be addressed in future environmental documents. It is therefore not clear which specific future improvements are to be addressed in this DEIS. The list of projects on page 1-12 does not distinguish the Phase 2 from Phase 3 projects.

Summary

Additional archaeological inventory work is recommended for the Naval Air Station and for Site 1798 prior to finalization of the EIS. In addition, it would be preferable to have a burial treatment plan

approved and in place, so that project plans reflect the final disposition of Site 1798. A monitoring plan is also needed for work to be conducted along, under or near the runways in the areas of Site 1798.

All areas of the cane fields, the area west of the airport, and the immediate airport area that are to be impacted by Phase 1 improvements should have inventory level work completed for the Final EIS. As stated above, the specific locations of these areas, particularly the infrastructure improvements, are not clearly identified in the DEIS.

A data recovery plan for Site 2849, and a plan for additional inventory survey work in areas discussed above should be included in the Final EIS, if the additional survey is not completed prior to EIS finalization.

It would be preferable to address effects of the phase 2/3 projects, such as the perimeter fence and road, air cargo facilities, transient aircraft parking apron, widening of runway safety areas, and land acquisitions as early as possible in the planning process. It appears that certain of these project are to be addressed in the current EIS. For these projects, inventory level work should be completed for the final EIS.

Aloha,

DON HIBBARD, Deputy
State Historic Preservation Officer

KD:jen

cc: OEQC
Dept. of Transportation, Airports Division (Owen Miyamoto)
Edward Noda and Associates (615 Piikoi St., Suite 300, Honolulu 96814)

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AFFIDAVITS OF PUBLICATION

IN THE MATTER OF

LEGAL NOTICE

AFFIDAVIT OF PUBLICATION

LEGAL NOTICE
NOTICE IS HEREBY
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f the ahupua'a of Wailu-
u.
Hon. Adv.: July 30; Aug.
, 1997) (A-45537)

LEGAL NOTICE
NOTICE IS HEREBY GIVEN that the International Archaeological Research Institute, Inc., representative of the State Department of Transportation, Airports Division, landowner, on its Kahului Airport Project, has reverified the location of unmarked burial sites containing human skeletal remains in its lands at Wailuku, Maui, Tax Map Key 3-08-01:19 former site of Naval Air Station, Kahului. All the lands are a piece or parcel of land being a portion of Grant 3343 to Claus Spreckles.

The remains were determined to be Native Hawaiian and proper treatment shall occur in accordance with Chapter 6E, Hawai'i Revised Statutes, Section 43.5, regarding unmarked burial sites.

The decision whether to preserve in place or disinter and relocate human remains shall be made by the Maui/Lana'i Islands Burial Council.

The Maui/Lanai Islands Burial Council is requesting DESCENDANTS OF HAWAIIANS WHO ONCE LIVED IN WAILUKU to immediately contact Kai Markell, Esq. of the State of Hawaii Historic Preservation Division, 33 South King Street, 6th Floor, Honolulu, Hawai'i 96813, telephone (808) 587-0047 to present information regarding Appropriate treatment of the unmarked human remains. Individuals responding must be able to adequately demonstrate family connection to the burials of the ahupua'a of Wailuku.

(Hon. S.-B.: July 30; Aug. 1, 1997) (SB-7742)

STATE OF HAWAII
City and County of Honolulu ss.

Valerie L. Yanagihara *being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of the HAWAII NEWSPAPER AGENCY LIMITED PARTNERSHIP, a partnership of GANNETT PACIFIC CORPORATION, publisher of the HONOLULU ADVERTISER, and LIBERTY NEWSPAPERS LIMITED PARTNERSHIP, publisher of the HONOLULU STAR-BULLETIN, that said newspapers are newspapers of general circulation in the state of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspapers as follows:*

The Honolulu Advertiser: two *times, on* July 30, 1997, August 1, 1997

Honolulu Star-Bulletin: two *times, on* July 30, 1997, August 1, 1997

Sunday edition of The Honolulu Advertiser: _____ *times, on* _____

and that affiant is not a party to or in any way interested in the above entitled matter.

Subscribed and sworn to before me this 1st *day of* August *A.D. 19* 97

Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires March 7, 2000

ELSIE A. MARUYAMA NOTARY PUBLIC STATE OF HAWAII

IN THE MATTER OF

LEGAL NOTICE

LEGAL NOTICE

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(Hon. Adv.: Aug. 3, 1997) (A-45538)

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII
City and County of Honolulu ss.

Valerie L. Yanagihara *being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of the HAWAII NEWSPAPER AGENCY LIMITED PARTNERSHIP, a partnership of GANNETT PACIFIC CORPORATION, publisher of the HONOLULU ADVERTISER, and LIBERTY NEWSPAPERS LIMITED PARTNERSHIP, publisher of the HONOLULU STAR-BULLETIN, that said newspapers are newspapers of general circulation in the state of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspapers as follows:*

The Honolulu Advertiser: _____ *times, on* _____

Honolulu Star-Bulletin: _____ *times, on* _____

Sunday edition of The Honolulu Advertiser: one *times, on* August 3, 1997

and that affiant is not a party to or in any way interested in the above entitled matter.

Subscribed and sworn to before me this 3rd *day of* August *A.D. 19* 97

Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires March 7, 2000

ELSIE A. MARUYAMA NOTARY PUBLIC STATE OF HAWAII

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII, County of Maui. } ss.

Kamery A. Lee III ..... being duly sworn deposes and says, that he is Advertising Sales ..... of the Maui Publishing Co., Ltd., publishers of the MAUI NEWS, a newspaper published in Wailuku, County of Maui, State of Hawaii; that the ordered publication as to .....

Legal Notice

of which the annexed is a true and corrected printed notice, was published .....3..... times in the MAUI NEWS, aforesaid, commencing on the 30th day of July, 1997, and ending on the 3rd day of August, 1997, (both days inclusive), to-wit: on .....

July 30; August 1; August 3, 1997

and that affiant is not a party to or in any way interested in the above entitled matter.

Kamery A. Lee

Subscribed and sworn to before me this 4th day of August A.D. 1997

Betty E. Uehara

Notary Public, Second Judicial Circuit, State of Hawaii.

My commission expires 9-26-99

BETTY E. UEHARA NOTARY PUBLIC STATE OF HAWAII

LEGAL NOTICE

NOTICE IS HEREBY GIVEN that the International Archaeological Research Institute, Inc., representative of the State Department of Transportation, Airpo[illegible] Division, landowner, on its Kahului Airport Project, [illegible] reverified the location of unmarked burial sites containing human skeletal remains in its lands at Wailuku, Maui, Tax Map Key 3-08-01:19 former site of Na[illegible] Air Station, Kahului. All the lands are a piece or pa[illegible] of land being a portion of Grant 3343 to Claus Spreckels.

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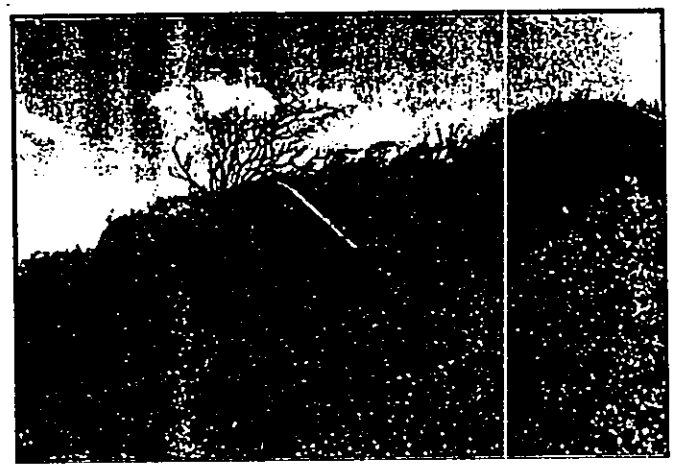
The Maui/Lanai Islands Burial Council is requesting DESCENDANTS OF HAWAIIANS WHO ON[illegible] LIVED IN WAILUKU to immediately contact [illegible] Markell, Esq. of the State of Hawaii Historic Preservation Division, 33 South King Street, 6th Floor, Honolulu, Hawai'i 96813, telephone (808) 587-004[illegible] present information regarding appropriate treatment [illegible] the unmarked human remains. Individuals responding must be able to adequately demonstrate family connection to the burials of the ahupua'a of Wailuku.

(MN: July 30; Aug. 1, 3, 1997)

ARCHITECTURE AND ARCHAEOLOGY AT NAVAL AIR STATION KAHULUI KAHULUI AIRPORT, ISLAND OF MAUI



by

Ann Yoklavich, Spencer Mason Architects
and
M.J. Tomonari-Tuggle and David J. Welch, IARII

INTERNATIONAL ARCHAEOLOGICAL RESEARCH INSTITUTE, INC.
AUGUST 1997

ARCHITECTURE AND ARCHAEOLOGY AT
NAVAL AIR STATION KAHULUI
KAHULUI AIRPORT, ISLAND OF MAUI

by

Ann Yoklavich, M.S.
Spencer Mason Architects
and
M.J. Tomonari-Tuggle, M.A.
David J. Welch, Ph.D.
International Archaeological Research Institute, Inc.

prepared for

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INTERNATIONAL ARCHAEOLOGICAL RESEARCH INSTITUTE, INC.
949 McCully Street, Suite 5
Honolulu, Hawai'i 96826

August 1997

This document is printed on acid-free, archival bond paper. It is intended to provide a long term record of the cultural resources of Hawai'i.

EXECUTIVE SUMMARY

An inventory survey of the remains of Naval Air Station, Kahului (NAS Kahului), which falls within the existing Kahului Airport master plan area, has been conducted in response to a State Historic Preservation Division review of a 1996 draft environmental impact statement for the airport.

NAS Kahului was one of several military facilities constructed on the neighbor islands during World War II and one of three principal naval facilities on Maui. Construction began in 1942 and included development of runways, aircraft maintenance buildings, other support buildings, barracks, magazines, and aviation gasoline storage tanks. Training facilities included a moving target machine gun range, a skeet and trap range, a malfunction range, and a machine gun school. After the end of the war, the station geared down rapidly as the Navy withdrew men from its facilities on Maui. The Navy eventually transferred the facility to the Territorial government.

The architectural and archaeological remains of NAS Kahului range from standing structures to concrete foundations and ruins. Although the present survey focuses on standing buildings, this report integrates data that was collected during the 1994 survey conducted as part of the EIS documentation. A total of 36 intact or partially intact structures and an additional 37 building foundations were recorded; the remains of three other structures are evident only as piles of timber or mounds of rubble.

Although NAS Kahului played an important part in the World War II build-up of training facilities in Hawai'i, the remains of this naval air station are in such poor condition that the complex no longer meets the integrity criteria for National Register significance. However, the ammunition magazines in the Kanahā Pond wildlife refuge and the enlisted men's beach pavilion meet significance criteria A and C and retain sufficient architectural integrity to warrant consideration of National Register eligibility as parts of a historic district. Although it remains as only a concrete foundation, Building 411, the Officer's Club, is possibly eligible to the Hawai'i Register under the significance criterion regarding cultural value to a particular ethnic group because of its use by AJA veterans after the war.

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I. INTRODUCTION

At the request of Edward K. Noda and Associates, Inc. (EKNA), International Archaeological Research Institute, Inc. (IARII) and Spencer Mason Architects have conducted an inventory survey of the remains of Naval Air Station, Kahului (NAS Kahului). The project area is within the bounds of Kahului Airport, Kahului, Maui County, Hawai'i (TMK 3-8-01-various). This survey is in response to a State Historic Preservation Division (SHPD) review of a 1996 draft environmental impact statement (DEIS) for the airport. The environmental impact statement is being jointly prepared by the Federal Aviation Administration (FAA) and the State of Hawai'i, Department of Transportation, Airports Division, in accordance with the requirements of the National Environmental Policy Act of 1969, as amended, and Chapter 343, HRS, as revised.

The project area is roughly coterminous with the existing Kahului Airport master plan area (BCA 1993). The airport covers about 585.4 hectares (1,446 acres) at the eastern edge of Kahului town, the largest community on the island of Maui (Fig. 1). Non-airport properties that were once used for naval station activities include Maui County's Kanahā Beach Park, the 230-acre Kanahā Pond Wildlife Sanctuary managed by the State Department of Land and Natural Resources (DLNR), and numerous commercial activities west of the airport terminal.

Kahului Airport has two active runways and a third closed one. Runway 2-20 is the main runway, measuring 2,134 m (7,000 ft) long and 45.7 m (150 ft) wide; it parallels a portion of the Hana Highway. Runway 5-23 is 1,521 m (4,990 ft) long and 45.7 m (150 ft) wide and is parallel to the coast. Runway 17-35, which was built during World War II, is no longer in use, although portions are still used as a taxiway and for helicopter parking; this runway is oriented roughly north-south, with its north end terminating at Alahao Street (which follows the former Kahului Railroad alignment). The airport passenger terminal is located between Runway 2-20 and the west end of Runway 5-23. Other support facilities and the FAA air traffic control tower are located along the south side of Runway 2-20. Most NAS Kahului remains are located in the peripheral areas of the present airport, i.e., west of the main terminal, near the shoreline, and southeast of Runway 2-20.

NAS Kahului was one of several military facilities constructed on the neighbor islands during World War II and one of three principal naval facilities on Maui (U.S. Navy, Bureau of Yards & Docks 1947). Construction was begun in 1942 and included development of runways, aircraft maintenance buildings, other support buildings, barracks, magazines, and aviation gasoline storage tanks. Training facilities included a moving target machine gun range, a skeet and trap range, a malfunction range, and a machine gun school. Infrastructure for sewage treatment, electrical lines, and water mains were installed.

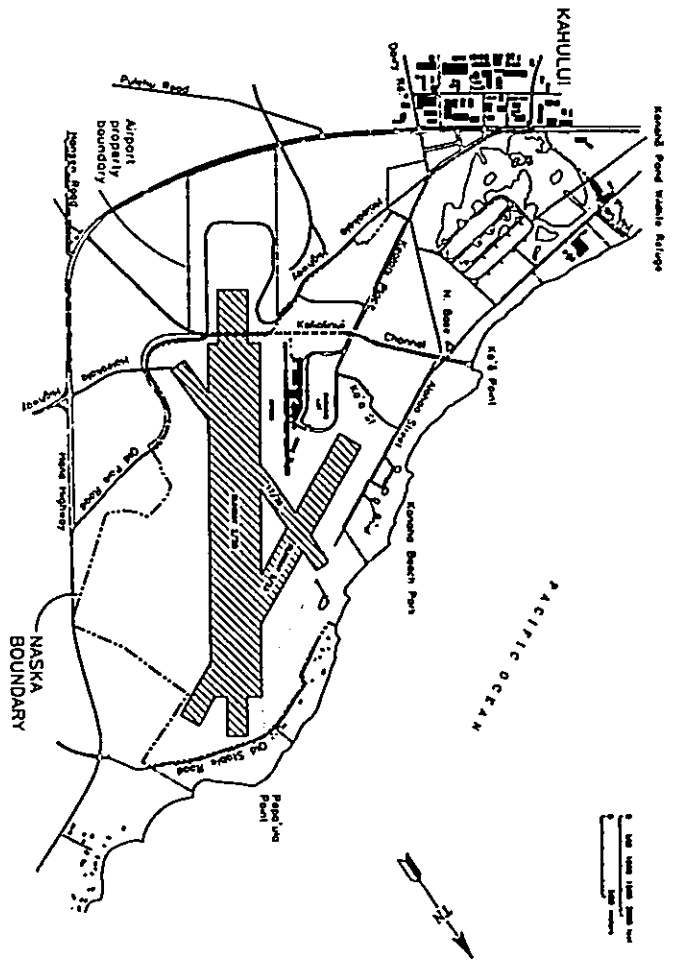


Figure 1. Kahului Airport EIS study area.

PROJECT SCOPE-OF-WORK

The tasks undertaken for this project are outlined in a proposed scope-of-work (letter to Brian Ishii, EKNA, from David Welch, IARII, dated July 22, 1996):

> The inventory survey of Naval Air Station, Kahului (NASKA) buildings will involve a review and compilation of data collected during the preceding archaeological assessment (IARII report dated July 1994), additional historical research on NASKA, limited field time by IARII to review areas that were not visited during the assessment, more extensive field time by a professional architectural historian to assess the standing buildings, and a detailed evaluation of significance of the standing buildings. This work will be carried out jointly by IARII and Spencer Mason Architects. Based on discussions with the SHPD Maui archaeologist, subsurface testing (which is required for inventory level surveys) will only be required if there is a need to clarify the function of certain remains.

A comprehensive discussion of the history and archaeology of the Kahului Airport area was prepared for the 1996 draft EIS. The reader is referred to Tomonari-Tuggle and Welch (1994) for the larger view of human activity before World War II when NAS Kahului was developed.

ENVIRONMENT

The NAS Kahului area is largely developed, with virtually no natural conditions remaining except along sections of the coastline. Vegetation within the airport proper is primarily comprised of introduced species, with landscaping in the vicinity of the terminal. Primary non-landscaped vegetation in the main NAS Kahului area west of the present airport is *koa haole* (*Leucaena leucocephala*) and *kiawe* (*Prosopis pallida*). Vegetation along the coast includes these species, as well as ironwood (*Casuarina equisetifolia*) and various grasses. Other vegetation includes Indian pluchea (*Pluchea indica*), sisal (*Agave sisalana*), castor bean (*Ricinus communis*), beach naupaka (*Scaevola sericea*), beach morning glory (*Ipomoea pes-caprae*), and Christmas berry (*Schinus terebinthifolius*).

Mean annual rainfall in the Kahului area is about 19 inches, most of which falls from November to April. January and February are the wettest months of the year and June is the driest month. The winds are predominantly northeast trades.

The geologic formation of the northern edge of the project area is lithified sand (see Macdonald and Abbott 1970:Figure 203; 326) overlain by still active calcareous sand dunes. The greater part of the area is weathered basaltic andesite, with a surface layer of brownish red dirt full of rock fragments, underlain by solid rock (Contractors Pacific Naval Air Bases n.d.:A-1119).

Kalialinui Stream, which runs along the southwest side of the airport, is the only drainage in the project area. Originating from the northwest slopes of Haleakalā near the crater summit, it is the longest watercourse on Maui (Welch 1988a). The stream is intermittent, with very little water flowing during the dry summer months. It historically drained into a coastal marsh with no exit into the ocean; it has been channelized in recent years and now exits into the ocean just west of Ka'ā Point.

The coastline, which is oriented along a slight northeast to southwest axis, consists of a series of shallow embayments marked by small rocky points or promontories, the most distinct of which are Ka'ā Point at the outlet of Kalialinui Channel and Papa'ula Point at the northeast end of the main runway. Behind the sand beach (and seaward of the airport perimeter fence) are rolling coralline sand dunes oriented roughly parallel to the coast. The dunes rise as high as 4.6 m (15 ft) above sea level (asl) and are separated by low areas only about 0.9 m (3 ft) asl. Kanahā Beach Park, operated by Maui County, occupies about 1,100 m (3,608 ft) along the beachfront east of Kalialinui Channel. West of the Kalialinui drainage, the coast has been altered by beach erosion and construction. Erosion has been a problem along this shore since at least the turn-of-the-century (Stearns and Macdonald 1942:56).

Kanahā Pond covers approximately 34.4 hectares (85 acres) and is managed as a wildlife preserve by the State Department of Land and Natural Resources. The preserve as a whole includes 93.1 hectares (230 acres) of airport property.

PROJECT HISTORY

This survey is part of documentation required for completion of an Environmental Impact Statement (EIS) for Kahului Airport, based on an Airport Master Plan developed by Belt Collins and Associates (BCA 1993). A cultural resources assessment was undertaken by IARII in 1994 (Tomonari-Tuggle and Welch 1994). It consisted of literature review of historical and archival materials and reports of previous archaeological studies in the airport area and limited ground survey, including relocation of numerous buildings and foundations of NAS Kahului structures. The intent of the assessment was to determine the presence of any structures that might be eligible for the National Register of Historic Places, evaluate the potential adverse effect of airport construction on any cultural properties in the airport area, and prepare recommendations for avoidance or mitigation of those adverse effects.

Among other findings, the 1994 assessment proposed that the standing structures and foundations related to NAS Kahului be considered potentially significant and eligible for the National Register and that Buildings 101, 244, and the remaining foundation of Building 411 be considered for preservation. The assessment recommended that the structures and a sample of the remaining structural foundations be recorded in detail by an architectural historian as part of the data recovery for the airport construction (with data recovery to include recording and photographing of a representative of each of the major types of buildings that composed the air station).

The SHPD of the Department of Land and Natural Resources responded to the draft EIS (letter from Don Hibbard, Deputy, State Historic Preservation Officer, to David J. Welhouse, FAA, dated May 21, 1996). It concurred with the archaeological assessments in the 1994 report and recommended additional inventory work of the naval air station before finalization of the EIS. The review letter notes that:

> There appear to be some structures within this site that may be architecturally significant...We believe that an inventory survey of the site should be conducted, with site assessments by an architectural historian, in order to determine whether selected buildings should be preserved. At this time, we do not have sufficient information to determine the extent, nature, and location of data recovery work that is needed for this site.

This letter also assigns a State Inventory of Historic Places (SIHP) site number, 50-50-05-4197, to all of the World War II remains of NAS Kahului. The scope-of-work for the present project developed out of subsequent meetings with EKNA, IARII, and the SHPD staff archaeologist for the island of Maui.

In response to a request from the SHPD, the Maui Military Museum (1997) offered comments to the 1996 draft of the present report. Information on the historical context of the airport and on the remnant planes have been incorporated into Section II and the comments in total are included as an appendix.

II. HISTORIC CONTEXT OF NAS KAHULUI

This section of the report outlines the historical context for NAS Kahului. As general background, it presents a brief history of airports on the island of Maui, an overview of naval aviation history, and a summary of Navy construction on the island. Specifically, it details the development of NAS Kahului and the post-war transition from naval air station to civilian airport

HISTORY OF AIRPORTS ON MAUI

Maps in the early annual report of Territorial Aeronautical Commission (1928, 1929) show two proposed airports on Maui, one in Wailuku and one in Lahaina. However, photocopies of photographs in the Hickam AFB History Office show that in the 1920s there were also landing fields at Mā'alaea, Kahului, and Hana. By 1930, a Territorial airport had been established at Mā'alaea; there were also three listed emergency landing fields on Maui at Lahaina, Honokāhau, and Spreckelsville (Territorial Aeronautical Commission 1930:23). Scheduled flights to Maui by Inter-Island Airways (now Hawaiian Airlines) also started in 1930, landing at Mā'alaea, (Ashdown 1946a:9).

Scheduled passenger and mail flights to Maui by Inter-Island Airways (now Hawaiian Airlines) started in 1929, with seaplanes landing at Mā'alaea, (Maui Military Museum 1997). Initially, service was by Sikorsky S-38 twin-engined float planes, although these were replaced by Sikorsky S-43 "Baby Clippers" in 1935. Mail was carried overland to Wailuku for distribution. Mail flights transferred to the "mudflat" Mā'alaea runway between 1936 and 1937 according to Norman Saito, while most passengers continued to use seaplanes until 1941 (Maui Military Museum 1997).

In reporting the opening of a new airport in Hana in 1934, the *Honolulu Star Bulletin* mentions an airport in Wailuku (*Honolulu Star Bulletin* May 28, 1934:5). The exact location of this airport and the extent of improvements is not known; it was probably only a landing field. The article describes a Navy plane that broke a wheel when landing at this airport.

Past or planned airfields in the northern part of the Maui isthmus have been referred to by several location names, including Wailuku, Kahului, Spreckelsville, and Kanahā. A photocopy of a 1926 photograph in the Hickam AFB History Office is labeled "landing field 3 miles east of Kahului," while a 1923 photograph at the Hawaii State Archives is of another field labeled "landing field 6 mi. E. of Kahului." Both of these fields appear to have no facilities other than an area cleared of trees and bushes. The period and amount of use of these fields is not well documented.

Locations of airports on several islands changed frequently in the early years of aviation, partly as a result of technical innovations in plane and airport designs, and partly due to political pressures to locate airports near economic or population centers. By 1936, the

airport at Mā'alaea, was considered unsuitable because it was located too close to the West Maui mountains and the runways could not accommodate the "larger planes being brought to the islands by Inter-Island Airways and the Army" (*Maui News* Nov. 14, 1936:1). The new Territorial airport was to be located on the southeast part of the isthmus, closer to Kīhei, in a section of land called Pu'unēnē. The advantages of this site were cited by the manager of Inter-Island Airways as "More consistent wind direction. Smoother air. Room for adequate runways. Greater distance from West Maui mountains" (*Maui News* May 5, 1937:5). Another article specifically mentions why an airport site at Kanahā was ruled out (*Maui News* May 12, 1937:2):

> Kanaha was dropped because of surrounding hazards such as a high smoke stack to the west, a high powered transmission line bordering the boundary. In addition to this, the prevailing winds would necessitate approaches and takeoffs over a populated area.

After two years of planning, work at the Pu'unēnē site started in February 1938 with funding by the federal Works Progress Administration (WPA) and the Territorial Department of Public Works, and with the provision of a rock crusher by Maui County (*Maui News* Feb. 23, 1938:1). Although optimistic projections in 1936 anticipated only two months to complete the work, there were two shutdowns of work in mid-1938 (*Honolulu Star Bulletin* Sept. 5, 1938:1). Regular inter-island service did not start at this airport until April 1939 (*Maui News* Apr. 15, 1939:1). The Army expressed interest in further improving Pu'unēnē airfield about this time, but the Navy was non-committal (*Maui News* Apr. 29, 1939:1):

> Army spokesmen said that informal surveys have been made of all Territorial airports, and believed that participants in the surveys will ask the governor in the near future to set aside certain portions of outside island airports for government use... Navy officials denied that they contemplated any projects, although they reiterated their assertion that they are always interested in fields that can be used by aircraft carrier planes.

In May 1939, the *Maui News* (May 6, 1939:1) reported Army plans involving construction of barracks and hangars and stationing of an air corps unit at Pu'unēnē airport. However, this report was based only "on a reliable source close to headquarters," and was not officially confirmed. The only construction reported at the airport in 1939 was a new administration building for Inter-Island Airways (*Maui News* May 20, 1939:1). The Navy was the first military arm to develop facilities at Pu'unēnē, making a sudden request in June 1940 to Maui County to utilize county employees in the construction (*Maui News* June 19, 1940:1). Runway expansion to a length of 610 m (2,000 ft) was undertaken by WPA labor with Territorial funds in October 1940 (*Maui News* Oct. 19, 1940:1). Most of the further improvements at Pu'unēnē airport were made by the military. The Maui Military Museum (1977) noted that during World War II civilians were limited to steamship transport for inter-island travel.

A BRIEF OVERVIEW OF NAVAL AVIATION HISTORY

The United States' first naval air station was built in Pensacola, Florida in 1914. During World War I, the Navy set up seven seaplane patrol bases along the east coast, and had two additional air stations at Norfolk and San Diego. The three air stations, but not all the patrol bases, continued in use as aviation training stations after World War I. During the 1930s, eight naval reserve air bases were established across the U.S. and three more air stations were built on the west coast, "to accompany the transfer of the Fleet's main strength to the Pacific" (U.S. Navy, Bureau of Yards & Docks 1947, Vol. I:227). Two lighter-than-air (dirigible) stations and a Marine Corps air station were also established after World War I.

The first Navy aviators arrived in Hawai'i in 1919 on the USS *Chicago*. They established a temporary base at Pearl Harbor, and reached agreement with the Army to share Ford Island. Both land planes and seaplanes were used by each service air branch (Coletta 1985:445). The number of Navy planes grew from four in 1919 to 39 in 1932, and the conflict with the Army's use of Pearl Harbor air facilities increased. The Army developed Wheeler Field in the 1930s and started plans for Hickam Field as a bomber base in the late 1930s. By 1936, carrier-based naval aviation was developing rapidly and the Navy command recognized the need for more space for visiting fleet squadrons, as well as for Hawai'i-based patrol planes (Coletta 1985:449).

In 1939, the Navy had only eleven air stations and eight reserve air bases in the continental U.S. Ford Island was still the only naval aviation facility in Hawai'i (Hewlett 1939). The need for additional naval aviation facilities was recognized in the report to Congress by the Hepburn Board of December 1938. Subsequently, authorization was given to build new naval air stations on the mainland, as well as at Kāne'ohe on O'ahu, to expand the Ford Island air base, and to develop air facilities on Midway atoll, and Johnston and Palmyra islands (U.S. Navy, Bureau of Yards & Docks 1947, Vol. II:121). A consortium of construction companies named Contractors, Pacific Naval Air Bases (CPNAB) was awarded the contract to build naval aviation facilities in the Pacific; CPNAB was responsible for most construction between 1939 and mid-1943, when the Naval Construction Battalions (CBs or Seabees) took over the work.

After the December 7, 1941 attack on Pearl Harbor, tremendous expansion of military facilities, both Army and Navy, took place on O'ahu and the outer islands. Hawai'i became a major logistics and training complex for the Pacific war. At the peak, over 242,914 hectares (600,000 acres) of land was being used to support the war effort. This is roughly two and one-half times the area presently used by the military. Military installations were constructed on Hawai'i, Maui, Kaua'i and Moloka'i, with only the privately owned islands of Lāna'i and Ni'ihau left relatively untouched.

Naval carriers required land-based installations for support and training. The facilities to repair and maintain planes were more easily provided on land, and training was also more economically done on land, since carriers "must be going full speed into the wind

in order for planes to land ... and a carrier going at full speed uses a lot of oil" (*Maui News* Oct. 5, 1940: Fair Suppl. 56).

HISTORY OF OTHER NAVY CONSTRUCTION ON MAUI

Maui was the first neighbor island to have a Navy installation, because the fleet was already using the relatively calm waters off Lahaina and Kihei as an anchorage. The first Navy project was at what was then officially called Maui Airport, but sometimes informally called Pu'unēnē airport (the early history of this airport is described above). The Navy issued preliminary plans for Naval Air Station Pu'unēnē in June 1940, and field work started there in the middle of that month (Contractors Pacific Naval Air Bases n.d.:A-1104). In the first phase of the Navy construction at Pu'unēnē, starting in June 1940, ten wood-frame structures were planned to support a utility squadron, performing such functions as "towing target sleeves for gunnery practice and servicing of planes off carriers" (*Maui News* June 20, 1940:1). Expansion of Navy facilities at Pu'unēnē to accommodate four squadrons of naval aircraft was announced in July 1940 (*Maui News* July 24, 1940:1), although construction did not begin until October 1940 (*Maui News* Oct. 19, 1940:1). While CPNAB was constructing buildings, the U.S. Army Corps of Engineers opened bids for work on the airfield grading and paving in May 1941 (*Maui News* May 14, 1941:1).

Although the *Maui News* articles call the VJ-3 unit at Pu'unēnē a utility squadron, the CPNAB report calls it an experimental aviation unit. This report also explains that the expansion at Pu'unēnē was just an addition to the original contract: "Before the work was finished, it was decided to add facilities to accommodate one carrier group; additional personnel and training facilities, dispersed parking bunkers, magazines, etc. were added at intervals" (Contractors Pacific Naval Air Bases n.d.:A-1113). Although Navy planes and men were stationed here as early as June 1940, it was not commissioned as a naval air station until January 25, 1942 (Ashdown 1946b:7). The station served as an Army depot, a Navy transport service base, and an airport for civilian planes, as well as a carrier-group training installation.

Overall construction responsibility at the Pu'unēnē site was transferred to the Corps of Engineers for the months of March through October 1942. The reason for this turn-over is not clear, but CPNAB complained about the delays involved in this process (Contractors Pacific Naval Air Bases n.d.:A-1126). Although CPNAB was called back in November 1942, they were ultimately replaced by Navy Construction Battalions (CBs or Seabees) in April 1943 (Contractors Pacific Naval Air Bases n.d.:A-1104).

The station grew until it could handle eight squadrons at one time (Ashdown 1946c:8). The name of the facility had progressed from Maui Airport to Naval Air Station, Maui to Naval Air Station, Puunene. The last name change was necessary to distinguish it from the new naval air station that was established near Kahului.

By the time NAS Kahului construction commenced in 1942, Pu'unene's utility squadron VJ-3 shifted toward the accelerated development of drone aircraft technology, thus forming the basis for future Navy guided missile programs. NAS Kahului maintained carrier air group training, which was begun at Pu'unene, and, together, these Maui aerodromes trained in coordinated sorties with the O'ahu-based Army Air Forces over the Kaho'olawe restricted bombing range (Maui Military Museum 1997).

Non-airport Navy projects on Maui included about ten structures near the pier at Kahului. Work on this Kahului Section Base was started by the Corps of Engineers, continued by CPNAB, and finished by the Seabees. The Section Base was "used in unloading most of the building materials for Maui projects" (Contractors Pacific Naval Air Bases n.d.:A-1104). The pier itself had been built before World War II, and had been used mostly as a sugar handling facility. The CPNAB report also mentions construction of gunnery training facilities, including a machine gun moving target range, at the old Mā'alaea Airport, and the construction of magnetic and navigational ranges and facilities at Mā'alaea Bay (Contractors Pacific Naval Air Bases n.d.:A-1101). Camp Maui, a training area for the 4th Marine Division, was built near Haiku, Maui (Keys 1992:38). This 30,000-man center consisted of tents and Quonset huts (U.S. Navy, Bureau of Yards & Docks 1947. Vol. II:152). In 1943, the 10th Marine amphibious tractor unit moved into the old Mā'alaea airport site (Ashdown 1946b:7). Another installation was a Marine Corps storage depot, consisting of an open storage area and "40 large Quonset huts on 4-foot concrete walls," with a loading platform and a railroad siding, location not noted (U.S. Navy, Bureau of Yards & Docks 1947, Vol. II:152). Two Navy training camps for underwater demolition crews and small boat crews were located in tent cities south of Kamole (U.S. Navy, Bureau of Yards & Docks 1947, Vol. II:152).

DEVELOPMENT OF NAS KAHULUI

After the Pearl Harbor attack, it was decided that an additional naval air station was required at Kahului. Before 1942, the project area was peripheral to the town of Kahului. World War II brought major changes to Kahului and particularly this area which was largely a "bare waste where little existed besides the prickly pear, the razor back hog and the wild indigo" (Baldwin 1915:47). At the beginning of the war, about one-third of the land that eventually became NAS Kahului was in cane fields and the remaining portion was "pasture containing swamps and fish ponds" (U.S. Navy, Bureau of Yards & Docks 1947, Vol. II:151).

Some of the swamp was drained by the channelization of Kalialinui Stream. In 1922, the stream was an intermittent drainage cutting through a very shallow but relatively well-defined gully; the stream flow terminated at the inland edge of the coastal flat. The gully was channelized during World War II and an outlet to the ocean was apparently constructed at this time. In the late 1980s, archaeological excavations along this portion of the stream suggested that "the land along the gulch now appears to be fill land, probably modified during channel cutting and airport construction" (Welch 1988a:3).

Preliminary plans were issued for NAS Kahului in October 1942, and CPNAB started construction at the installation the next month. Since Hawai'i newspapers reported little about military facilities in 1942 and 1943, the main source of information is the CPNAB report: "The Naval Air Station, Kahului, was designed by Holmes & Narver, Industrial and Architectural Engineers, Los Angeles... [D]esign work progressed concurrently with construction," although many buildings were based on standard plans issued by the 14th Naval District (Contractors Pacific Naval Air Bases n.d.:A-1115). The Seabees took over construction in March 1943. When NAS Kahului was officially established on March 15, 1943, only the construction camp and construction plant were completed. The camp had 28 buildings, including 12 96-man barracks, a 750-man mess hall, four warehouses, five shop buildings, one office, and five other buildings. The construction plant set-up included an asphalt plant, rock crusher, and concrete-batching plant. Utilities, including two railroad sidings, were also installed. The contractors also did "about 25 per cent of the clearing, grading, and draining preparatory to runway construction" (Contractors Pacific Naval Air Bases n.d.:A-1117). Construction of the runways also required relocation of part of the Kahului Railroad and a Territorial highway (Contractors Pacific Naval Air Bases n.d.:A-1125).

Most buildings were temporary wood construction. In a letter to the Officer in Charge of Construction, the Chief of the Navy Bureau of Yards and Docks notes: "It is desired to reiterate that all buildings shall be of the (most) temporary and cheapest type of construction commensurate with the function of the facility, making use of an absolute minimum amount of critical materials" (Contractors Pacific Naval Air Bases n.d.: A-1116). Another important criterion in the design of the air station was the dispersion of buildings and airplane parking, a measure taken to prevent extensive damage in case of another enemy attack on Hawai'i. Surface and underground aviation gasoline storage tanks were installed at the station.

The few NAS Kahului buildings remaining from the World War II period were probably all built by the Seabees after March 1943. Most of these are concrete ammunition storage structures in the Kanahā Pond area.

Cinders for construction at NAS Kahului came from Pu'u Nēnē, a cinder cone near Hāli'imaile, while Pu'u Hele was quarried for the cinders needed at NAS Puunene. The CPNAB report (Contractors Pacific Naval Air Bases n.d.:A-1126) notes that the Pu'u Nēnē site:

> was occupied by an Oriental cemetery. Under the surveillance of numerous descendants of the Chinese and Japanese deceased, the contractors established a new necropolis at a near-by site, carefully exhumed and reinterred the ancestral remains.

In the early 1990s, local airport employees, describing airport development during World War II (Welch 1991), reported that not all the burials at the cemetery were moved before the transfer of fill began.

Two runways (17-35 and 2-20) were initially constructed, each 152 m (500 ft) wide and 1,524 and 2,134 m (5,000 and 7,000 ft) long, respectively, with work made difficult "by the considerable blasting operations required" (U.S. Navy, Bureau of Yards & Docks 1947, Vol. II:152). By September 1943, the runways were usable enough to have a Carrier Aircraft Service Unit (CASU) based at the station (*Maui News* Oct. 27, 1945:11). Construction of facilities continued throughout the war, as training and maintenance of planes was conducted.

The Maui Military Museum (1997) notes that "the Japanese surrender came as the station was being rapidly expanded to handle four air groups. New sets of barracks, bachelor officer's quarters, and galleys were completed but never used." A few buildings at NAS Kahului were constructed after the end of the war, but generally the station geared down rapidly and there was little need for new construction. The Navy withdrew men from both of its naval air stations on Maui and there was great debate in choosing one to become the new Territorial Airport. The Navy vacated NAS Puunene by the end of October 1945 and apparently intended to keep NAS Kahului as a permanent station, although with reduced staffing (*Maui News* Oct. 31, 1945:1).

POST-WAR TRANSITION FROM NAS KAHULUI TO KAHULUI AIRPORT

Personnel and equipment were transferred from NAS Puunene to NAS Kahului in September and October of 1945, and NAS Puunene became a "ghost base" (Ashdown 1946d:9). NAS Kahului remained in operation, but with a much smaller personnel count. Families of officers were allowed to come to live on Maui, requiring conversion of barracks into family apartments (*Maui News* Feb. 2, 1946:2). Even some new buildings were constructed in 1946 to provide family housing (*Maui News* May 11, 1946:7).

The tidal wave that hit Maui and other Hawaiian islands on April 1, 1946 did some damage to NAS Kahului, particularly along the shoreline with "loss of the Officers Beach Club, and damage to the Captains House and the Enlisted Men's Beach Club" (*Maui News* April 13, 1946:6). The station opened its dispensary, mess hall, and barracks to the injured and homeless.

In November 1946, plans to further reduce forces at NAS Kahului were announced. The *Maui News* (Nov. 27, 1946:1) reports:

> Abandonment of airfields in Hawaii as training bases for naval air pilots and crews was not the navy's idea but congressional pressure to locate stations in the continental United States was so great that appropriations to maintain and operate Hawaiian fields were vitally curbed.

The Navy was obviously reluctant to give up NAS Kahului. While it only took a few months to close up NAS Puunene, it was reported in April 1947 that "quite some considerable time" was still required to close NAS Kahului (*Maui News* April 23, 1947:1). In June 1947, the Navy offered NAS Kahului to the Territory, but only on a revocable permit basis (*Maui News* June 25, 1947:1); the Navy wanted to be able to reclaim the air station in

case of a national emergency. Maui County officials and leading citizens preferred Kahului, rather than Pu'unēnē, as the Territorial airport. On the other hand, the Civil Aeronautics Administration (CAA) and the Territorial government favored Pu'unēnē because the title of ownership was better than the revocable permit offered for NAS Kahului (*Maui News* July 2, 1947:1).

A decision to accept NAS Kahului was apparently made in August 1947 (*Maui News* August 13, 1947:1). However, many years of wrangling followed before it actually became Kahului Airport in 1952; title was not actually transferred until 1956. Meanwhile, the residential area of the air station was reused for housing, first for veterans and later for any island residents (*Maui News* December 6, 1947:1; June 30, 1948:10). Commercial airlines continued to use Pu'unēnē airfield during the late 1940s and early 1950s (*Maui News* Aug. 3, 1949:1). It was reported in 1949 that the Navy wanted to retain certain areas of NAS Kahului (*Maui News* Aug. 3, 1949:1). Maui businessman Harold W. Rice was appointed to the Hawaii Aeronautics Commission and lobbied hard for the acceptance of NAS Kahului, even with the revocable permit. He stressed that the bumpy wind currents at Pu'unēnē "have given Maui air an unenviable reputation with all air passengers" (*Maui News* Aug. 6, 1949:1). Other reasons for insisting on Kahului were stated, such as lower cost to the County for maintenance and better availability of water and electrical service at Kahului compared to Pu'unēnē (Young 1947). Harold Rice was often mentioned in newspaper articles, and appeared to be one of the main proponents of the Kahului site for the main Maui airport.

In 1952, the *Honolulu Advertiser* (June 6, 1952:2) reported that President Truman signed legislation authorizing the Navy to transfer the former NAS Kahului to the Territory of Hawai'i. It was not until December 10, 1956 that a quitclaim deed conveyed the property from the United States of America to the Territory of Hawai'i (Bureau of Conveyances Book 4250:299). The attempts to move the commercial air operations from the Pu'unēnē airport to the Kahului one were delayed because of this land title issue, but the shift occurred in 1952, before clear title was obtained (*Honolulu Advertiser* Aug. 10, 1958:Supp. 23). The Navy explained one reason for the lengthy process was that "the title was in process of transfer when the Korean war started and then was delayed" (*Honolulu Advertiser* Dec. 16, 1954:A6).

Improvements to Runways 2-20 and 5-23 have been made over the years, and these two are presently used as the main runways. Runway 17-35, the north-south runway which was one of the main runways during World War II, was later designated a taxiway. Many other construction projects have occurred at Kahului Airport over the four-plus decades of its use as a commercial airport. Only a few reminders of the naval air station remain.

III. ARCHAEOLOGY AT KAHULUI AIRPORT

This section of the report summarizes the archaeological work that has been carried out in and near the NAS Kahului project area, including the previous survey of NAS Kahului remains that was carried out in the assessment for the draft airport EIS (Tomonari-Tuggle and Welch 1994). A more detailed discussion of the archaeology of the environs of Kahului Airport is presented in Tomonari-Tuggle and Welch (1994).

PREVIOUS ARCHAEOLOGICAL STUDIES

Although there have been several archaeological studies carried out in the area within and surrounding Kahului Airport (see Table 1 in Tomonari-Tuggle and Welch 1994:28), only one has addressed NAS Kahului remains. As part of a survey for Kahului Airport, Welch (1988b) observed concrete structures (interpreted as possible magazines or bunkers), asphalt roads, and concrete foundations, noting that the lower area near Alahao Street "resembles in many ways the area around the former Ewa Marine Corps Air Station at Barbers Point Naval Air Station on O'ahu...which was also largely abandoned after World War II" (Welch 1988b:7).

Numerous archaeological backhoe trenches have been excavated along the shoreline of Kahului Airport. Although not explicitly described as such, the uppermost layers of these trenches are probable remains of imported fill related to NAS Kahului development. For example, Folk and Hammatt (1991:25) found evidence of considerable grading in the area just inland of Kanahā Park; this interpretation is based on "the high percentage (25-75%) of pebble sized gravel mixed in the very compacted upper soil layers and the almost complete absence of wind blown sediments in this geographically widespread environment of dune sand." This locale was the site of a row of NAS Kahului buildings along the inland side of the Kahului Railroad right-of-way (NASKA 1953).

PREVIOUS NAS KAHULUI SURVEY

Between May 17 and 19, 1994, David Welch inspected the known locations of former NAS Kahului structures as part of the draft EIS assessment (Tomonari-Tuggle and Welch 1994). During previous surveys, these features were either ignored or only briefly described and their significance not clearly evaluated. Since the time of these earlier surveys, there has been an increasing recognition of the importance of recording and preserving at least a portion of the remaining structures associated with World War II and, now that 50 years have passed since the war, these structures are potentially eligible for inclusion in the National Register of Historic Places. Therefore, compliance with historic preservation laws clearly requires an evaluation of the significance of World War II features.

During the 1994 survey, a 1953 NAS Kahului building inventory map was used as a field reference to identify remaining structures, their present condition, and a preliminary evaluation of their significance. In 1996, maps and facility lists from the 1940s were located. Table 1 updates the results of the 1994 field work, giving the World War II functions, and the 1994 conditions of the structures.

The locations of approximately 200 of the 258 buildings shown on the 1953 map of military structures were inspected in 1994. Of these, the foundations of 49 structures were still extant, and eight of the superstructures were wholly or partially intact. Facility 101, an unnumbered beach pavilion west of the present Kanaha Beach Park near the former skeet range (Facility 244), and the remaining foundation of Building 411, with inscribed compass markings, were particularly impressive. The remains of a moving target machine gun range (shown on the 1953 map but not identified with a facility number) were also found. The Kanaha Pond Wildlife Sanctuary was excluded from the 1994 survey, even though it was known to contain military structures. Access was not permitted because it was breeding season and the structures could not be examined or their intactness confirmed.

Table 1. NAS Kahului Building Inventory, Based on June 1945 Building List.

BUILDING FUNCTION	Standing	Foundation Only	PRESENT CONDITION Destroyed	Unknown/Probably Destroyed
HOUSING and SUPPORT				
bachelor officers' quarters	-	725	306, 328, 341, 342	307, 308, 310, 721, 723-725
barracks, enlisted men's	-	211, 253, 253A, 255-258, 255A-258A	303A, 313-317, 319-324, 314A, 316A-324A, 340	3-9, 11, 13, 16, 17, 19, 21, 22, 33, 203-207, 203A-207A, 212-215, 211A, 212A, 214A, 215A, 232, 232A, 234, 234A 12, 231C, 815A
barracks, miscellaneous	-	416	302A-E	--
CO quarters	-	--	410	--
flect officers' quarters	-	--	409	
laundry	-	123, 774	--	328A, 416A
messes, galleys, and garbage houses	-	414, 415, 415A, 726, 728	251	208, 208A, 250, 250A, 305A-B, 318, 318A, 414, 415, 415A, 722
VEHICLE/AIRCRAFT SUPPORT				
aviation gasoline storage	-	-	-	228, 229, 229A, 229B, 326, 326A, 327, 327A, 822
av gas pump control, loading rack	-	--	--	227, 334, 823
bulk gasoline storage tank	-	-	-	125, 126
foam house	-	-	-	127
garage	-	240A, 248B	235	--
gasoline pump house	-	--	727	128
maintenance/repair shops	27	770	232, 233, 236, 516, 517	505-511, 516, 517, 770
UTILITIES				
auxiliary power plant	-	-	-	830
boiler house	-	124	246	--
chlorinator	-	-	-	825
refrigeration plant	-	-	339	210
sewage disposal	-	-	-	237, 503, 818
telephone exchange	-	-	335	--
transformer house	-	-	241, 338, 716	280, 329, 405, 528, 553
water storage, pump house	-	120	234, 850	402, 403, 730, 811

Table 1. NAS Kahului Building Inventory, Based on June 1945 Building List. (cont.)

BUILDING FUNCTION	PRESENT CONDITION			
	Standing	Foundation Only	Destroyed	Unknown/Probably Destroyed
WEAPONS				
ammo handling equipment bldg	102	--	--	--
armory	--	--	--	14, 325
bomb sight repair vault	--	--	--	808
gunnery school	--	240	--	--
inert storehouse *	101		--	--
magazines, fuse & detonator	103-105	--	--	--
magazines, high explosive	110-117	118, 119**	--	--
magazines, ready service	--	--	--	413A-C
magazines, rocket	122	--	--	--
magazines, small arms	107-109, 242	--	239A	239A, 302F-G
magazine, smoke drum	106	--	--	--
moving target machine gun range	--	--	247 (partial berm remaining)	--
range house	--	--	239	243
rifle range	--	--	--	121
rocket assembly	--	--	--	417
skeet range	244	--	245	--
torpedo workshop/storage	--	--	--	807
OFFICES and STOREHOUSES				
warehouses	248A, 771, 772, 810	222, 223, 705, 773, 817	220, 221, 226, 232, 309, 332, 714	23-25, 325, 338, 350-356, 401, 715, 807
offices	248C	315A	230, 231, 249, 304, 501, 502	2, 29-31, 129, 130, 512-514, 550A-C, 701, 820, 821, 824, 829, 830A
education/training buildings	--	--	333, 520, 521	32, 550D, 551, 552

Table 1. NAS Kahului Building Inventory, Based on June 1945 Building List. (cont.)

BUILDING FUNCTION	PRESENT CONDITION			
	Standing	Foundation Only	Destroyed	Unknown/Probably Destroyed
RECREATION				
athletic building	--	--	344, 345	209A, 816
beach club/beach house	--	--	--	261, 262
beer garden	--	259	--	--
handball court	backstop remaining	--	--	--
library	--	--	--	313A
officers' club/club annex	411B	411A, 411C	--	412
swimming pool	260	--	--	--
tennis court	pavement remaining	--	--	--
theater	--	330	--	--
MISCELLANEOUS				
brig	--	--	--	217
bus terminal	--	--	311	--
chapel	--	--	343	--
dispensary	--	--	--	219, 815
fire station	--	813	312	--
gear locker	--	--	--	218
guard house/lookout tower	--	--	--	238, 301A, 801
post office	--	331	--	1
ship's service	--	225, 225T	--	--

SOURCE: June 30, 1945 map of Naval Air Station, Kahului. Navy Public Works Office, 14th Naval District-Pearl Harbor, T.H.

* Listed as high explosive magazine in January 1945 building list.

** Buildings 118 to 121 shown as high explosive magazines on January 1945 map and building list; on June 1945 map/building list, Buildings 118 and 119 are not shown and Buildings 120 and 121 are identified as water pumphouse and rifle range, respectively.

IV. SUMMARY OF NAS KAHULUI REMAINS

This section summarizes the present survey: the manner in which it was carried out and the results. It also incorporates the data that was collected from the previous assessment (Tomonari-Tuggle and Welch 1994). The section concludes with evaluations of significance and recommendations for future work.

THE PRESENT SURVEY

The field work for the present survey focused on the standing structures remaining from the World War II period and on two military plane remnants. Only a few of the foundations from the 1940s were re-surveyed. On November 20, 1996, David Welch of IARII and Ann Yoklavich of Spencer Mason Architects examined the structures within the Kanahā Pond wildlife refuge, which had not been accessible during the 1994 survey. Most of the standing structures located during the 1994 survey, as well as two airplane remnants, were re-surveyed on this day also. Ann Yoklavich returned to Maui on November 26, 1996 to survey a few additional facilities and to re-examine a few that had been surveyed on the previous trip. Photographs of all standing structures and the two plane remnants were taken; the handball court and Facility 122 were so covered by vegetation that a clear photo was not possible. The field work started with the list of standing structures discovered in the 1994 survey (Welch and Tomonari-Tuggle), but a few additional World War II facilities, including those in the ammunition storage area, were noted and surveyed in 1996, in addition to those in the ammunition storage area.

Historical research work in 1996 included a search for World War II maps and other records at several repositories, including the Pacific Division Naval Facilities Engineering Command library and plan files. No maps were found in the Navy's plan files, but their library has a microfilm copy of the CPNAB report, including a chapter on the Maui installations built during World War II. Mr. Sam Ohigashi at the DOT Airports Division office in Maui provided three useful maps from the 1940s; two of them dated January and June 1945 include building inventories, of which the June 1945 list is the most comprehensive list of facilities. A 1954 map and a 1955 building list were also found at the Hickam Air Force Base (AFB) plan files. The 1954 map was the clearest copy of all the maps located. Historic photograph collections at the Bishop Museum, the Hawaii State Archives, and the Hickam AFB History Office were also searched for useful photos. Newspaper indexes for Honolulu and Maui newspapers were used to retrieve articles about Kahului and other airfields on Maui.

RESULTS OF THE NAS KAHULUI SURVEY

NAS Kahului was built at the height of World War II military development in Hawai'i, as part of the effort to provide training and aircraft repair facilities for the carrier

forces. The runways that are still used for commercial flight were constructed both by CPNAB and by naval construction battalions. Housing, administrative, training, maintenance, and recreational facilities grew up around the runways, with the bulk of the NAS Kahului buildings, barracks, and related facilities located west of the present main airport complex.

Since 1952, civilian administration has taken over the airport management and commercial and local government activities have replaced most of the military structures. Nonetheless, scattered remains of the naval air station are still in place and a few structures remain intact. Table 2 summarizes the NAS Kahului buildings and foundations that remain in the Kahului Airport area. Figure 2 shows their location in the context of modern features. Figure 3 is a reconstruction of a June 1945 map of the air station, with extant buildings, structures, and foundations highlighted.

DESCRIPTIONS BY AREA, NOTING CHANGES OVER TIME

Descriptions of facilities that are more than foundations are described in more detail in the following sections. Most of the foundations are merely listed in Table 2, unless they have particularly notable features

KANAHĀ POND

Historical maps suggest that the entire coastal flat around Kanahā Pond was marsh land and that the pond itself could have been a natural formation that was only slightly modified by Hawaiians for fish cultivation. When Kahului Bay was first dredged in 1904, the dredge material was used to form the land on which the main business section of Kahului town sits (Burns 1991:48, in Kennedy et al. 1993:13). The marsh land in the nineteenth century covered much of what became Kahului town in the twentieth century.

A 1922 map shows that the coastal flat covered an area of about 5.6 by 1.6 km (3.5 by 1 mile), with Kanahā Pond in the center. The formative Kahului town was on level coastal land to the west of the pond. On the coastal side of the pond were 3 to 6 m (10 to 20 ft) high barrier dunes. The intermittent Kalialinui drainage drained into the coastal flat but did not exit into the ocean.

Kanahā Pond itself appears on all the historical maps of this area, a comparison of which indicates that the pond configuration, particularly the east edge, has been variable over the years; the western edge of the pond appears to have been relatively stable (see Fig. 9 in Tomonari-Tuggle and Welch 1994:26). The earliest map (Jackson 1881) shows the pond about one-half of its present size with a stone wall cutting across its middle; also shown is a marsh about 762 m (2,500 ft) to the east on the coastal flat fronting the lower end of Kalialinui Stream. In 1922, the pond was only slightly smaller than at present, with its west

Table 2. Buildings, Structures, and Foundations Identified in Current Survey.

Facility Number	Facility Function	Comment
27	area maintenance shop	standing building; no other structures in area
101	storehouse, inert	three semi-cylindrical concrete buildings joined in front and built on raised concrete foundation
102	ammunition handling equipment building	wood-frame building with addition
103-117	magazines	4 types of concrete magazines (see text)
120	pumphouse, water	foundation
122	steel magazine	collapsed
123	laundry	foundation
124	boiler house	foundation
211	barracks, EM (married)	remnant concrete blocks (possible structure supports)
222	storehouse	foundation
223	storehouse	foundation
225	ship's service	foundation
225T	ship's service, annex	foundation
near Fac. 234	water pumping plant	new facility built in same area
240	school, gunnery	foundation only; enclosing inner courtyard
242	magazines, (4) small arms	group of four concrete block structures on concrete foundations
-	beach pavilion, EM	pavilion with basalt cobble piers and double-pitched hip roof
247	moving target machine gun range	portion of inland berm intact; seaward berm no longer extant (destroyed by tidal waves or bulldozed for beach access road)
248A	storehouse	large Quonset hut with 1.2 m (4 ft) concrete walls
248C	office	abandoned partial structure with flat roof
249	P.W. field office	gable-roofed building, overgrown with vegetation
253	barracks, EM	foundation
253A	latrine	foundation
255	barracks, EM	foundation
255A	latrine	foundation
256	barracks, EM	foundation
256A	latrine	foundation
257	barracks, EM	foundation
257A	latrine	foundation
258	barracks, EM	foundation
258A	latrine	foundation

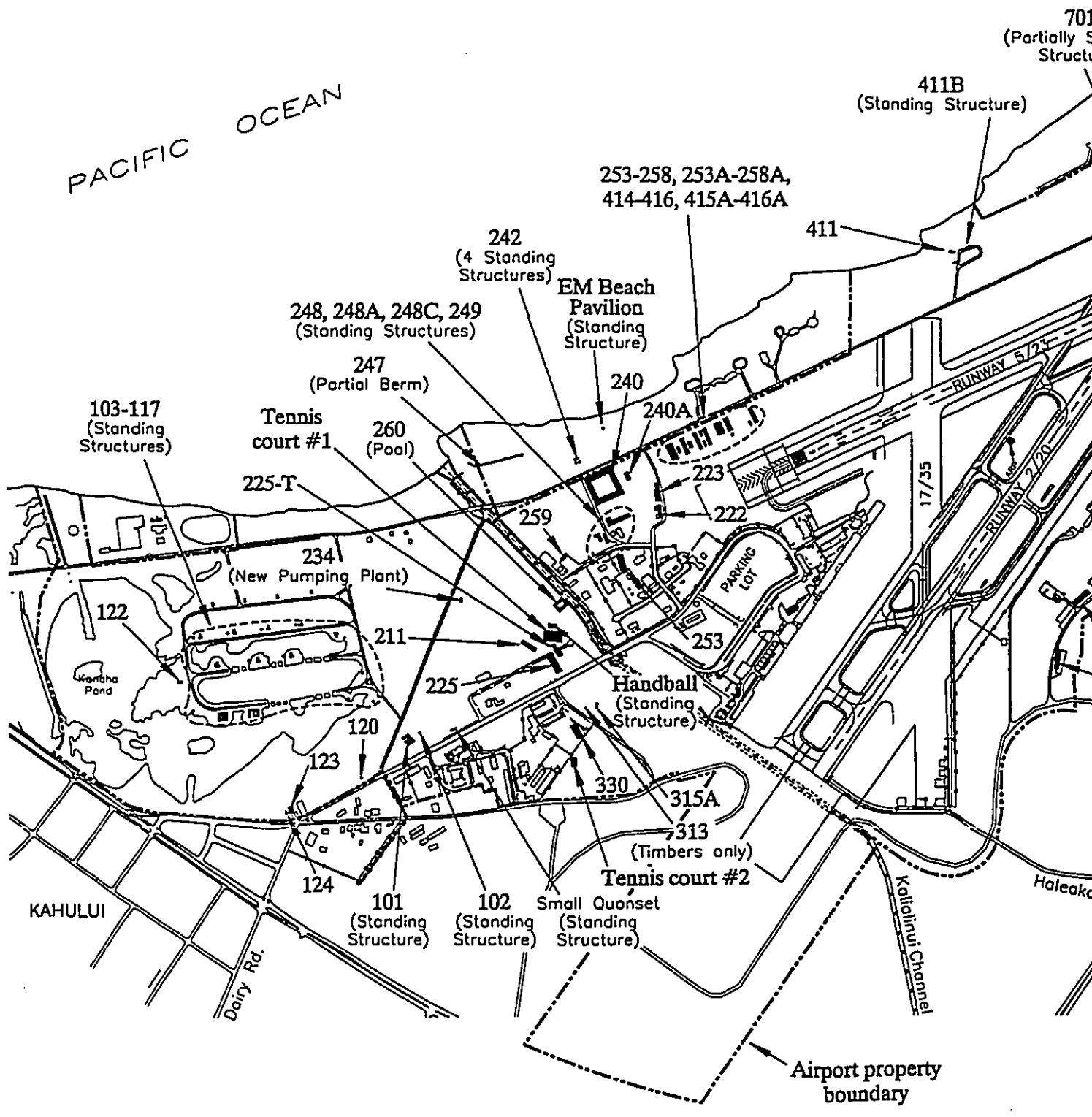
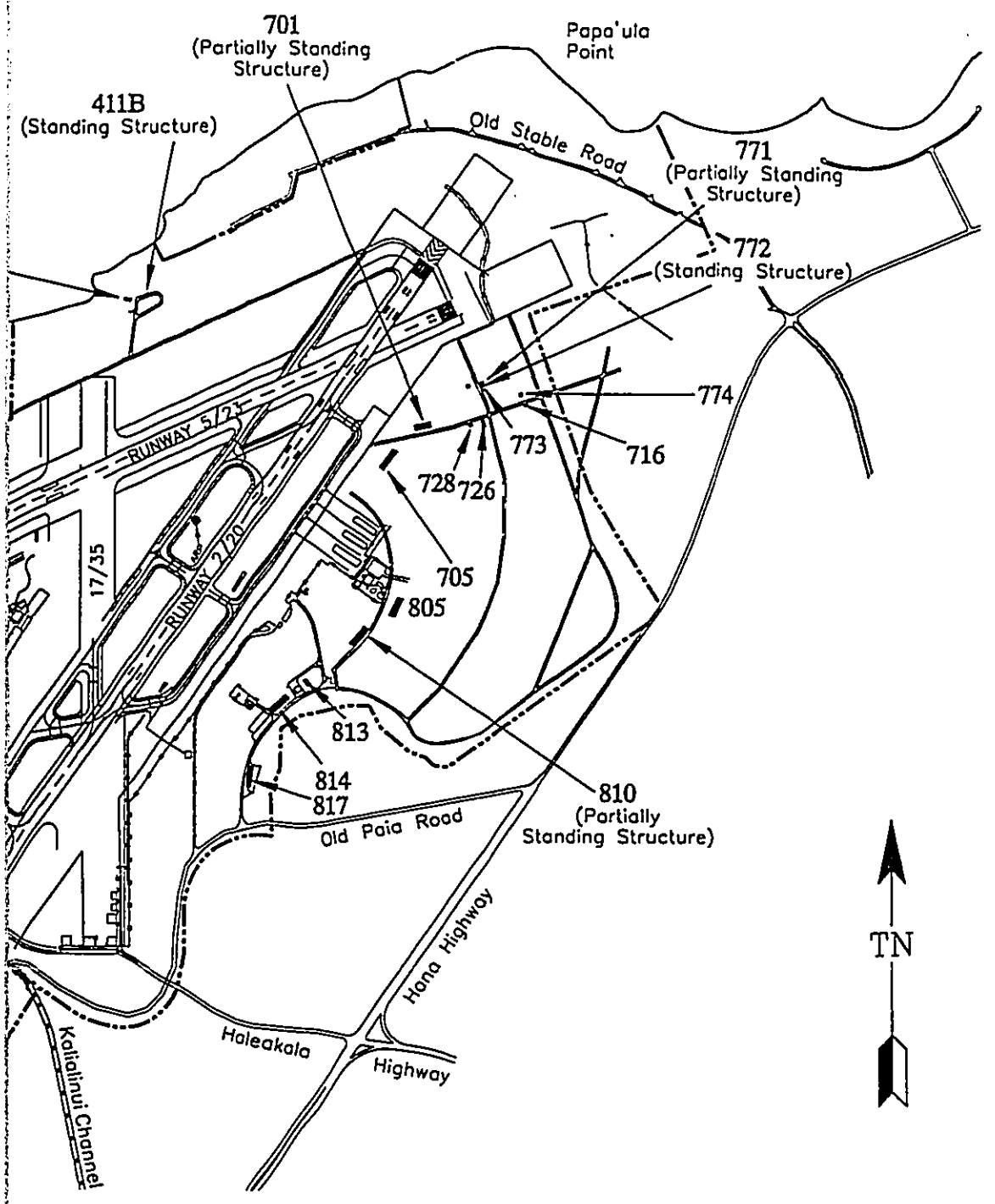


Figure 2. NAS Kahului buildings and foundations that remain, in the context of modern features.



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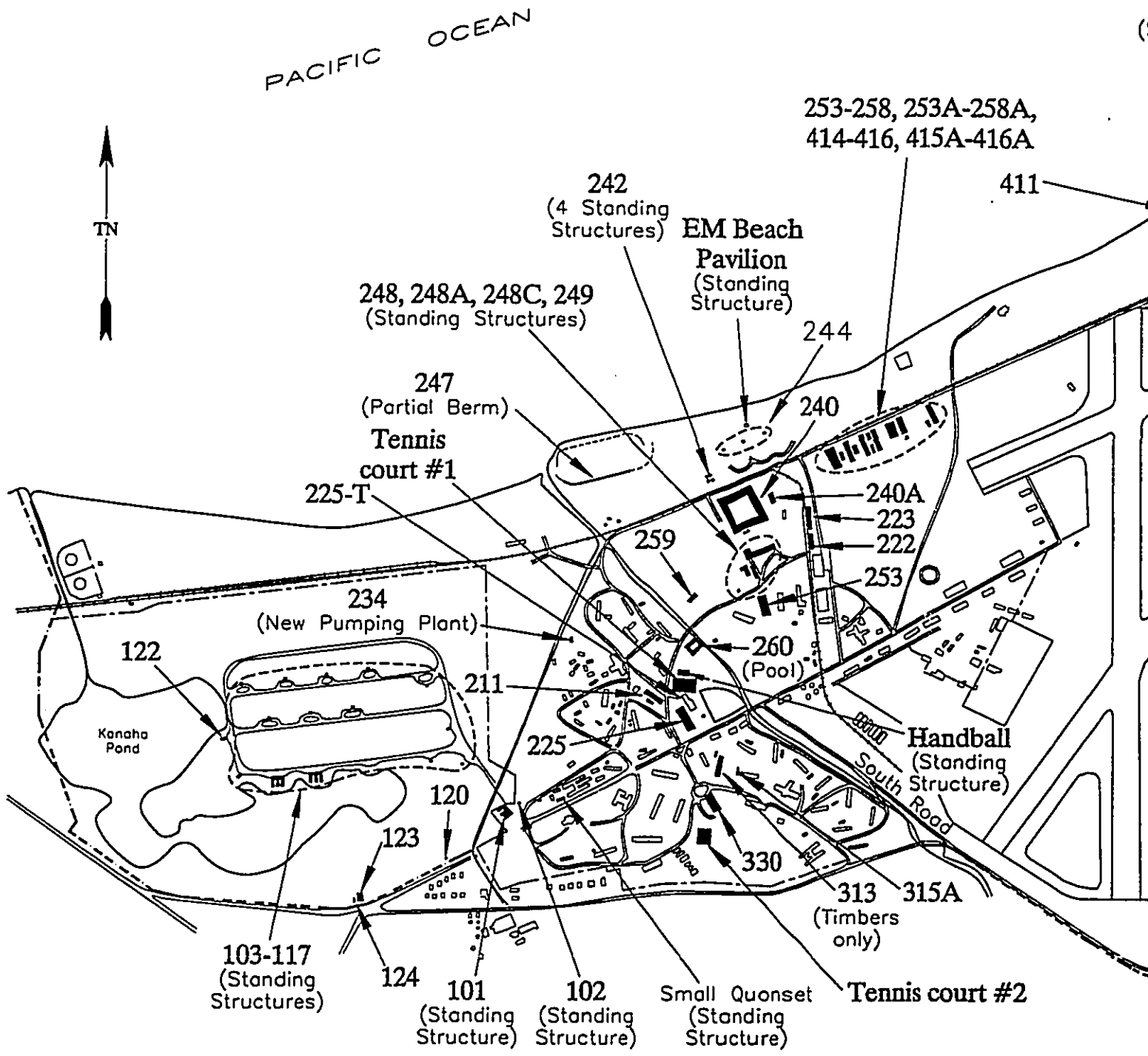

Figure 3. NAS Kahului buildings and foundations that remain, in the context of 1945 NAS Kahului facilities.

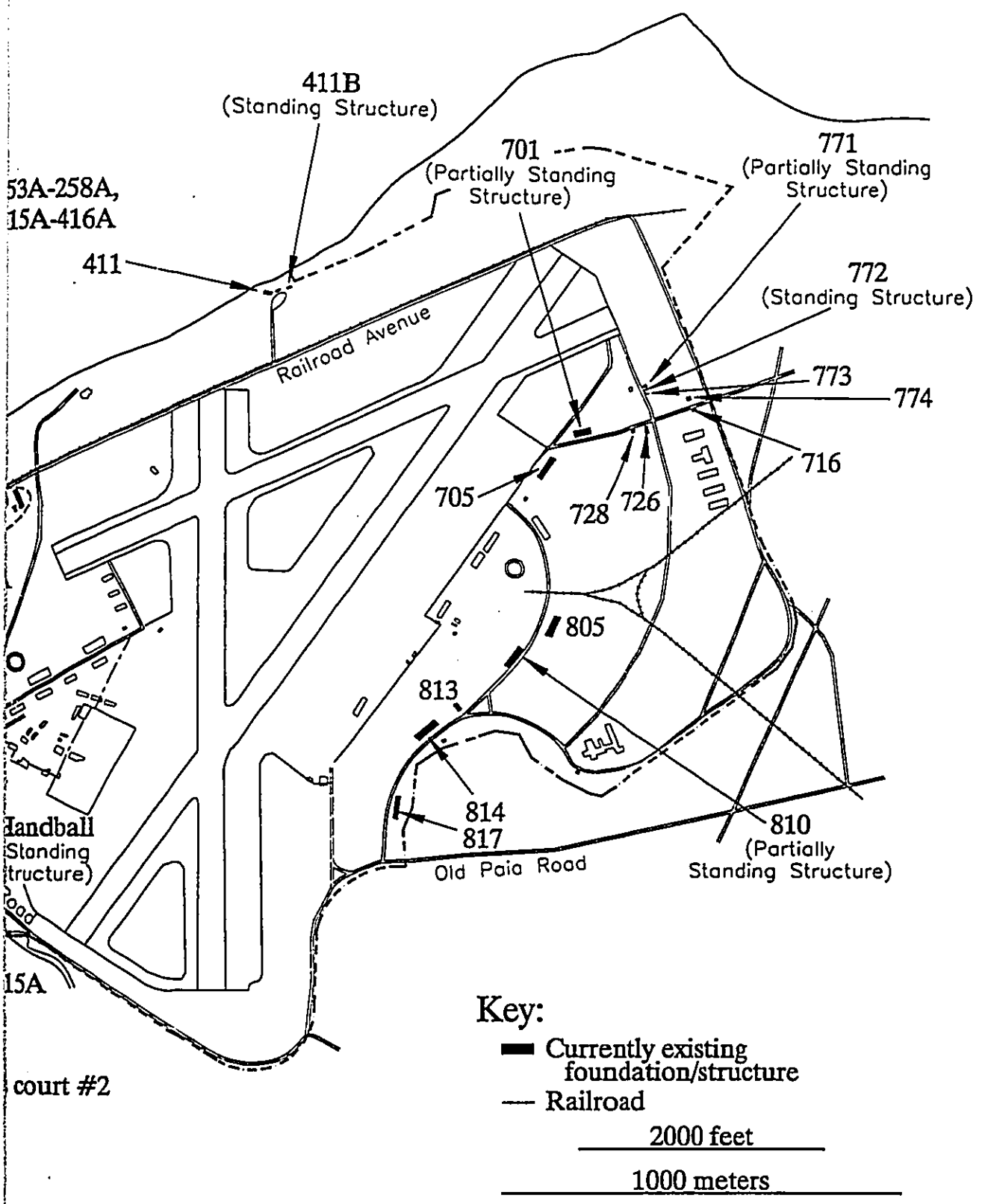
411B
(Standing Structure)
701
(Partially Standing Structure)
771
(Partially Standing Structure)
53A-258A,
15A-416A
411
Railroad Avenue
772
(Standing Structure)
773
774
716
705
728
726
805
813
814
817
Old Paia Road
810
(Partially Standing Structure)
Handball
Standing
tructure)
15A
court #2
Key:
Currently existing foundation/structure
Railroad
2000 feet
1000 meters

Table 2. Buildings, Structures, and Foundations Identified in Current Survey. (cont.)

Facility Number	Facility Function	Comment
259	beer garden	foundation
260	swimming pool	structure intact but cracks caused by vegetation
313	barracks, EM	pile of timbers
315A	MAA office and stores	foundation
330	theater	concrete foundation; front half now covered by construction supplies in DOT base yard
411	Officers' Club	concrete foundation with steps on inland side
411 B	storehouse	standing structure
414	mess hall	foundation
415	galley	foundation
415A	garbage house	foundation
416	WAVES Quarters	foundation
416A	laundry	foundation
701	supply office	foundation with small concrete room
705	storehouse	foundation
716	transformer	mound of rubble
726	butcher shop and cold storage	foundation, with remnants of stucco that covered insulation and long nails that attached insulation
728	bakery	foundation
771	storage, paint	Quonset hut superstructure partly intact; metal framing beams in place but most of roofing gone
772	storage, oxygen	Quonset hut superstructure partly intact; metal framing beams in place, also most of roofing
773	storage, acetylene	foundation
774	laundry	foundations and some equipment remains
805	storehouse	foundation
810	storehouse	foundation with large concrete room
813	fire station	foundation
814	storehouse	foundation
817	storehouse	foundation
--	Quonset hut in Marine Complex	Quonset hut superstructure altered and probably slightly moved from original location
--	handball court	wall intact
--	tennis courts #1	paving intact
--	tennis courts #2	paving intact

half similar to the configuration shown in Jackson (1881) but with an extension to the east. There was no marsh at the outlet to Kalialinui Gulch. Maps from the 1940s show the west half as roughly consistent with earlier maps but the east half was altered significantly by the construction of ammunition magazines and access roads. These were built on fill land in this watery area, and in a few places rock retaining walls are visible. Kalialinui Stream had been dredged to the ocean; subsidiary drainage channels extended from the Central Power Plant inland of the pond to the mouth of Kalialinui Stream and from Kanahā Pond to the ocean.

The major historical impact to the pond was construction of ammunition magazines and access roads during World War II. Most of these magazines remain intact and in relatively good condition. While none are used for ammunition, some are storehouses while others stand vacant. The area is currently administered as a wildlife refuge by the Department of Land and Natural Resources, Division of Forestry and Wildlife. Islands for nesting birds have been created recently by cutting through some of the fill-constructed roads. Foundations of Facilities 120, 123, and 124, which were a water pumphouse, a laundry, and a boiler building, respectively, also still exist within the wildlife sanctuary boundaries, near Keolani Place (formerly Main Street).

Runways

Although runway improvements have been numerous since original construction in the mid-1940s, their general configuration and orientation have not changed significantly. Comparing maps from the 1940s to present ones shows the major changes are in the more complex taxiway system. The June 1945 map (MA-N1-168) shows two major runways, running N-S and NE-SW with lengths of 1,524 and 2,134 m (5,000 and 7,000 ft) respectively, and both with widths of 183 m (600 ft), plus extensive adjacent paved areas. The runway running east-west is not labeled, but is 1,524 m (5,000 ft) long and 91.5 m (300 ft) wide; it is labeled as a runway on the other 1940s maps. The current runways are the NE-SW (Runway 2-20) and E-W (Runway 5-23) ones, but they are only 46 m (150 ft) wide. Slight extensions have been made to the ends of these runways. Two parallel taxiways to Runway 2-20 are built within the former 182.9 m (600 ft) runway width and adjacent former plane parking area. The N-S runway is no longer in active use, although a portion has been converted to a taxiway. Modern markings and lighting systems have been added to the runways and taxiways.

Area Between Kanahā Pond and Kalialinui Drainage

Three sub-areas lie between Kanahā Pond and Kalialinui Drainage. They are defined by Keolani Place (formerly Main Street) and Hele Street, a new road alignment. All of them are greatly altered from their World War II appearance.

Sub-Area 1

The sub-area north of Keolani Place (formerly Main Street) and east of Kealakoa Street (formerly Magazine Road) once had at least ten Enlisted Men's (EM) barracks, a mess hall, a refrigeration plant, storehouses, a water pumping plant, a barracks and office complex for the Marines, and recreational facilities, including a baseball field, swimming pool, and handball and tennis courts.

A portion of this sub-area now appears to be an industrial park, with construction and supply companies located along Kahale Street (formerly Barracks Avenue), along Keolani Place, or along the new road running parallel to it. Most of the sub-area is abandoned, although there is evidence of bulldozing and dumping in the areas *makai* of Kahale Street and the new road.

All that remains from World War II are the abandoned swimming pool and handball structures, the tennis court paving (designated #1), concrete slab foundations of storehouses (Facilities 225 and 225T), some road remnants, and two buildings possibly dating from World War II (Facility 102 and a small Quonset hut). A water pumping plant is located in the same general vicinity as the water facility labeled 234 on the 1940s maps, but it is obviously a modern plant. These buildings and structural remains are discussed in the inventory section below.

Sub-Area 2

The sub-area west of Hele Street and south of Keolani Place was occupied during World War II by an administration building, seven Bachelor Officers' Quarters (BOQs), a mess hall, a theater, tennis courts, and a large open recreation area. Just to the west lay the Power Plant camp of the Hawaiian Commercial and Sugar Company (which predated World War II, and existed into the 1950s). Six buildings constructed after World War II for additional Navy family housing are shown on a 1954 NAS Kahului map, located just west of the tennis courts.

All of this sub-area is now used for the baseyards of the Airport Division and the Department of Accounting and General Services. All that remains from the naval air station construction are the slab foundations of the theater (Facility 330) and the paving of the tennis courts (designated #2). These are listed in the inventory table below.

Sub-Area 3

The sub-area east of Hele Street, south of Keolani Place, and west of the Kalialinui drainage held another group of EM barracks and a mess hall, a refrigeration plant, two athletic buildings, a small storehouse, and along the main road four support function buildings, including a post office and a fire station.

All of this sub-area is now vacant land. Circle Avenue remains (although it is unused) and there is some paving in front of where Facility 339 was located. The only evidence of World War II buildings is one concrete slab foundation (Facility 315A) and a pile of timbers from a barracks building (Facility 313).

Area between Kalialinui Drainage and Runways

The area between Kalialinui Drainage and the runways was utilized for many purposes in World War II. Storehouses were located along a railroad spur running approximately north-south, as well as along Main Street (now realigned in a circle at the terminal end, and called Keolani Place). A set of three barracks and related facilities including a mess hall was located along Circle Avenue (now Palapala Drive), and another set of five barracks, four for enlisted men and one for WAVES, was located just south of the Kahului Railroad right-of-way. A large gunnery school was also located close to the railroad line. None of these facilities remain, except for some foundations. The only structures which survive from the 1940s are a Quonset hut (Facility 248A), and two abandoned buildings (Facilities 248C and 249). In the immediate area of the present terminal, not even foundations are visible, as new parking lots and buildings have covered all traces of the shops, offices, training buildings, nose hangars, and water reservoir built during World War II. Car rental lots and buildings in the area just north of Keolani Place are in the same locations as the World War II Red Cross building and oil storage facilities.

Area Southeast of the Runways

The area southeast of the runways was less densely developed during World War II than the other areas described above. The building areas are defined by the adjacent streets. Along East Road (a street which is unnamed on present maps, but which is the east boundary of the airport) were four Bachelor Officer's Quarters of which nothing presently remains; this area is planted in sugar cane. Located at the intersection of East Road and Kaua Street (formerly Paia Avenue) were a laundry complex and a transformer. Concrete foundations and some equipment remain of the laundry (Facility 774), but the transformer station is a mound of rubble. Just north of Kaua Street were three Quonset huts, two of which remain in a deteriorated condition (Facilities 771 and 772). Only the foundation remains of Quonset Hut Facility 773. A pile of debris sits in front of these buildings, in the location of the World War II lumber yard, and appears to cover the site of the former radio material shop. Along Kaua Street are the foundations of a bakery, a cold storage building, and a supply office (Facility 701). A concrete room sits on the foundation of the last building. Along Hangar Avenue, which formerly ran along the southeast side of the runways, only the foundations of one storehouse are visible. Nothing appears to remain of the other facilities, storehouse, shops and offices, and operations building that were located here during World War II. Much new construction has occurred in this area. Most of the area southeast of Eena Street (formerly Service Road and Camp Road) has reverted to sugar cane. Along this street, the concrete foundations of the fire house and of four of the storehouses remain. One of them,

Facility 810, has a large concrete room on the foundation, also probably dating from World War II. New buildings, including a fire house, are sited in the area where one other storehouse and a former reservoir were located, at the east end of this street. Sugar cane plantings cover the former location of the dispensary and related buildings that were sited along Camp Road. Camp Road, which ran along the naval air station boundary, no longer exists.

AREA ALONG BEACH

Along the coast are several structures and foundations, but most of the World War II facilities are gone. Beginning at Kanahā Pond outlet and working east, the sub-areas are described consecutively.

Two gasoline storage tanks and two related buildings were constructed during World War II at the Kahului end of the naval air station. The area is presently occupied by a salvage yard. Employees of the DOT Maui office stated that nothing was left of this World War II complex. Nothing was built by the Navy in the stretch of beach where the present wastewater treatment plant is. Nothing remains of the rifle range and the malfunction range (a disposal area for misfired and dud ordnance), which were located just west of Kalialinui Drainage.

On the east side of Kalialinui Gulch, the Building 239 group was destroyed long ago. At the mouth of Kalialinui Gulch, a long, narrow, 2 m (6.6 ft) high berm stands along what would have been the approximate inland side of the oval-shaped moving target machine gun range. The *makai* side of the berm no longer stands, and may have been destroyed by the 1946 tidal wave. The Facility 242 group, four small arms magazines built of concrete masonry units, still stands. A unnumbered beach pavilion, just east of Facility 242, remains standing. There is no evidence of the Facility 244 group, which included three skeet range trap houses and another skeet range structure; these were located inland of the beach pavilion.

Nothing of the World War II Enlisted Men's Beach House or Beach Club were seen in the west end of the new Kanahā Beach Park. Similarly, nothing appears to remain of the Commanding Officer's and Fleet Officers' Quarters which were located near the east end of the beach park. These were reported damaged in the 1946 tidal wave, and perhaps were never rebuilt (*Maui News* April 13, 1946:6).

East of Kanahā Beach Park and to the northeast of Runway 17-35 are the remains of the Facility 411 complex, which served as the Officers' Club. The main structure remains only as a concrete slab foundation with steps on the inland side. To the east is a standing small rectangular storehouse (Facility 411B). Just inland of the concrete slab are the ruins of two aircraft that were used as "fire trainers" for crash tenders and personnel at Kahului Airport in the early 1960s (Maui Military Museum 1997). During the present survey, it was observed that the remains of plane #2, located to the southwest of the Facility 411, had

apparently been scavenged since the 1994 survey; only a wing remained, even the fuselage having been taken.

DESCRIPTIONS OF STANDING STRUCTURES AND OF PLANES

AMMUNITION MAGAZINES

The ammunition magazines in the Kanahā Pond area (Facilities 101 through 117 and 122) were surveyed by Ann Yoklavich and David Welch on November 20, 1996. Facility 101 is included in this group functionally, although it lies outside the fenced wildlife area. Facilities 106, 110, and 111 could not be photographed, since the roads to these have been cut off to provide protected nesting areas. From a distance, these three magazines appear to be of the same type as the ones that were photographed.

The 1954 map was used during this field work, because the other maps had not yet been obtained. Since the 1954 map does not show any magazines located along the *makai* road in the refuge area, the area along this road was not surveyed. It was later discovered that the January 1945 NAS Kahului map and the 1994 DOT map of Kahului Airport show four magazines along the *makai* road; the June 1945 and the 1949 NAS Kahului maps do not show any magazines on this road. Mr. Duvall of the DLNR Maui office, was contacted on December 9, 1996; he recalled that two magazines along the *makai* road still exist, but that the roofs are collapsed. The two magazines that remain may resemble Facility 122, which is a magazine made of metal. The other magazines in the area are all built of concrete and are in good condition. There are four types of concrete magazines; an interior of at least one of each type was unlocked and could be inspected. The concrete in all the magazines appears to be in good condition, but some doors are missing or deteriorated.

Magazine Type 1 - Blast Wall Type

Facilities 110 through 117 are listed as high explosive magazines on World War II building lists (NASKA 1945). These eight buildings are semi-cylindrical ammunition storage magazines with concrete walls located about 3.7 m (12 ft) away from the entrance doors to protect against possible explosions. An asphaltic layer and the sandy earth of the area cover the magazines, and earth backs the blast walls. The rear ventilators project about 0.9 m (3 ft) above the earth cover. Photo 1 shows the typical drive-thru configuration of the magazine entrance and blast wall. While the face of the magazine is perpendicular, the blast wall is tilted slightly back, and is angled slightly at the sides. The blast wall measures about 24.8 cm (10 in) thick. The top of the blast wall is flat, while the entrance wall of the magazine is rounded, reflecting the interior semi-cylindrical shape.

The pair of doors to the ammunition magazines covers an opening approximately 2.7 m (9 ft) tall and 1.8 m (6 ft) wide (Photo 2). The doors are built of two layers of 2x6 inch

tongue-and-groove boards, one layer running horizontally and the other running vertically. The wood is covered with sheet metal, with a 1/2-inch thick metal plate on the inside. There are hooded vents on the lower portions of the doors and three strap hinges. The doors open onto the ground level of the drive-thru.

The inside of the ammunition magazines of this type measures approximately 7.6 m (25 ft) square in plan, and are almost semi-cylindrical in shape, although the lower 0.6 m (2 ft) of the walls are vertical. Two drainage channels run along the sides of the interior. There are two pilasters on the rear wall and at the sides of the door opening. The only other openings are a 0.3 m (1 ft) diameter ventilator in the ceiling near the rear wall, and two small drainage channel openings on the front wall.

Magazine Type 2 - Without Blast Wall Type

Facilities 106 and 109 are concrete magazines without a blast wall. Only Facility 109 (Photo 3) could be inspected in detail, as the road to 106 has been cut off at either side. Facility 106 was used for smoke drum storage and 109 for small arms storage (NASKA 1945), so blast walls were not required. Facility 109, and presumably Facility 106 as well, measures 7.6 m (25 ft) wide by 15.2 m (50 ft) long, twice as long as the high explosive magazines described above. The only other difference from Facilities 110-117 is that the doors do not open directly at grade but are raised about 0.3 m (1 ft) off the ground. Facilities 106 and 109 are otherwise similar to Type 1.

Magazine Type 3 - Triple Magazines

Facilities 101, 107, and 108 are triple magazines, each with three semi-cylindrical storage spaces joined by a front wall and opening onto a single loading platform (Photos 4 and 5). There is no blast wall on this type of magazine. The earth cover has been removed from Facility 101, and windows have been cut in the rear walls of the three storage spaces. The interior storage spaces measure 7.6 m (25 ft) wide by 24.4 m (80 ft) long. The loading platforms and the floors of the magazines are about 1.2 m (4 ft) above grade. There are steps at each end of the loading platforms and the drainage channels inside the magazines are diverted so as to open low on the platform wall. The retaining walls that connect the triple storage spaces are thicker than the front walls of the magazines. They are also battered, as can be seen in Facility 101 where the earth has been removed. Some of the doors are missing and some of the openings have been covered with plywood on Facilities 107 and 108. The door openings are about 2.4 m (8 ft) wide. The doors and construction details are otherwise similar to the Type 1 magazines. On both 1945 maps, Facilities 107 and 108 are listed as small arms magazines. Facility 101 is listed as a high explosive magazine on the January 1945 map, but is listed as an inert storehouse on the June 1945 map.

Magazine Type 4 - Rectangular Magazines

Facilities 103 to 105 are concrete magazines with small rectangular storage spaces, rather than semi-cylindrical ones. The entrance to this type of magazine also is quite different; there is a blast wall, but the passage leads only to the door and does not provide a drive-thru design like Type 1 (Photo 6). Magazine 105 is missing its door; the other two magazines have a single door measuring about 1.1 m (3.5 ft) wide by 1.8 m (6 ft) tall. The doors appear to be sheet metal over wood. There is no vent in the door but there are two small rectangular openings low in the wall to either side of the door. The interior rooms are rectangular, measuring 3.1 m (10 ft) by 4.3 m (14 ft), with a ceiling about 2.3 m (7.5 ft) tall. The walls are about 29.5 cm (9 in) thick. The blast wall opposite the entrance is battered. Like the other magazines, Facilities 103 to 105 are covered with earth.

Facility 122 - Armco Hut Magazine

Facility 122 is located on the west side of the ammunition storage complex. It appears collapsed and is almost completely covered with vegetation. Surrounding vegetation is also thick and prevented a clear photograph of the structure. Enough of the steel front wall was visible to identify it as a standard Armco hut. This type of prefabricated ammunition storage magazine was used on Army and Navy bases throughout the United States and the Pacific during World War II. It is a distinctive type of structure that has a similar shape, but different structure, from the Quonset hut. Both are semi-cylindrical buildings, but Armco huts are made of thick steel sheets with large corrugations so that an internal frame, required for a Quonset hut, is unnecessary. This type of steel is made by the Armco Steel Corporation and had originally been used for tunnel liners and large culverts (Easterly 1993). The steel sheets, termed Multi-Plate by the manufacturer, are shipped with predrilled holes, and are bolted together on-site. Each side of the arch of plates bears on and is bolted to a longitudinal base channel that itself is bolted to the concrete floor. This building typically has length and width dimensions of 15.2 m (50 ft) by 6.1 m (20 ft) and a height of 3.1 m (10 ft). Armco huts used for magazines were typically covered with earth.

This facility is listed as a rocket magazine on both 1945 NAS Kahului maps. The magazines that were built along the *makai* road, Facilities 118 to 121, were probably of this same type, although listed as high explosive magazines. Mr. Duvall of the DLNR Maui office reported that only two remain along this road and the ceilings of these have collapsed. This report of collapse makes it more likely that they were built of metal, like Facility 122.

FACILITY 102

This building is located at the corner of Kahale Street (formerly Barracks Avenue) and Kealakoa Street (formerly Magazine Road). It is a wood frame building with a gable roof and shed-roof addition of corrugated metal (Photo 7). On the south side, some of the siding is horizontal boards. There are large corrugated metal doors, sliding on an overhead

rail, on each end of both the main building and the addition. The windows are not original, with openings filled with jalousies or boarded up. Eckel Counter Top and Cabinet currently uses this building as a carpentry shop. Its original use is listed on the January 1945 NAS Kahului map as ammunition truck garage, but it was called an ammunition handling equipment building on the June 1945 and 1954 NAS Kahului maps. Mr. Eckel had been told the building was formerly a fire station.

Near Facility 234 - Water Pumping Plant

In the undeveloped area to the west of Kalialinui drainage is a water pumping facility. There was a World War II pumping plant in this general vicinity, but this existing complex is obviously of modern construction (Photo 8). The facility is fenced and consists of a flat-roofed building of concrete block and pumping equipment. The door is a modern hollow core flush type and the window is boarded up.

Facility 242 - Four Small Arms Magazines

This complex of four small rectangular buildings was given only one facility number (Photo 9). The complex is located *makai* of Alahao Street, between the former moving target machine gun range and the former skeet range. They are all built using full 8-inch by 16-inch concrete block (not nominal measurements). These buildings have flat roofs with 0.3 m (1 ft) overhanging eaves. The inside dimensions are 2.9 by 4.3 m (9.5 by 14 ft), with a height of 2.6 m (8.5 ft). The door openings are centered, but doors are missing on two of the buildings. The concrete blocks over the doors are placed vertically forming a jack arch. The doors are built of 2-inch tongue-and-groove boards, covered with sheet metal. There are two openings high in the walls to each side of the door, and the original wood louvers remain in a few of these openings. Additional openings have been cut into the concrete block on several buildings.

Enlisted Men's Beach Pavilion

This facility does not appear on either the January or June 1945 NAS Kahului building lists. Two other buildings that no longer exist, Facilities 261 and 262, located further east along the beach, were listed, respectively, as a beach house and a beach club for enlisted men. The two NAS Kahului maps from 1945 show a little square in this structure's approximate location, just *makai* of the listed Facility 244. The structure was originally thought to be Building 244 (Tomonari-Tuggle and Welch 1994:51) until research for the present project uncovered the 1945 facility list describing 244 as a skeet range. This structure is probably the Enlisted Men's Beach Pavilion discussed in the *Maui News* (June 12, 1946:8); the building, called "Helani," was "opened on Friday, August 1945, just one week after the ending of the war." The newspaper also notes that the building had been damaged by the tidal wave of April 1, 1946, but that the pavilion would be refurbished and reopened for dances.

This structure is a nicely proportioned recreational pavilion, built of local lava rock (Photo 10). It has a double-pitched hip roof of wood shingles. Twelve piers of uncoursed rubble masonry support the roof. Remnants of wood framing indicate that tall doors or floor-to-ceiling windows may have enclosed the 7.6 by 11.3 m (25 by 37 ft) space. One Maui veteran told IARII archaeologists of a beach club structure with 12 large windows (which would fit the three openings in each wall of this structure) where dances were held outdoors in the evenings. There is no interior floor, although a portion of concrete flooring remains on the inland side. The four corner piers are approximately 78.7 cm (24 in) square in section, and the interior piers are about 52.5 cm (16 in) square. Lava rock stairs, bordered by lava rock walls and lava rock posts, lead to the building on the west side. Three concrete steps are located on the west side of the building.

There is a hole in the roof, and a few rocks are missing from the lava rock piers. One post on the lava rock stairway nearby has fallen over. A large concrete slab, which may have been an outdoor patio of this building, is located in the water offshore. The building falls outside of the airport boundaries.

Facility 248A - Large Quonset Hut

This Quonset hut is located to the south of the car rental area at the airport, and is reached by Palapala Drive. It is listed as a storehouse on the June 1945 NASKA map, but is not included on the January 1945 list (although it is drawn on the corresponding map). This is a large Quonset hut, measuring about 12.2 by 30.1 m (40 by 100 ft) (Photo 11). The prefabricated Quonset hut is placed on 1.2 m (4 ft) high concrete base walls, which is a somewhat unusual feature. There is also a loading platform on the inland end. The building framing consists of 26 half-circle metal ribs spaced at 1.2 m (4 ft) on center, with purlins on top of the ribs running horizontally. Corrugated metal sheets are nailed into the framing. The corrugations in the roofing panel sheets are set at right angles to the corrugations in the sheets covering the sides. The double sliding doors are 3.7 m (12 ft) high, 1.8 m (6 ft) wide, and made of steel decking. Two non-original door openings (one large, one small) have been cut into the west side. The small opening leads into a room built of concrete block on the south end. There were originally two pairs of square windows on each end of the building, with a square ventilation opening above the doors.

Facility 248C - Office Building

This building is located south of the car rental area at the airport, just to the west of Facility 248A, the Quonset hut. It is not drawn or listed on the January 1945 map, but it is shown on the June 1945 list and map, with its use listed as office. The building is shown clearly on the 1953 NASKA map, but is not on the 1954 map or the 1955 NASKA list. This suggests the building was abandoned about 1954.

This partially demolished building has two sections, one with horizontal wood siding and one section with walls of concrete block (Photo 12). The concrete block section is unroofed and in worse condition than the wooden section which is the original portion. All the doors and windows are boarded up or smashed out. The flat roof has 3'-6" overhanging eaves.

FACILITY 249 - PUBLIC WORKS FIELD OFFICE

This building is located near the Quonset hut (Facility 248A) south of the car rental area at the airport. It is difficult to ascertain if this is a World War II building, because it is obscured both by vegetation and by many alterations over the years (Photo 13). It seems to correspond in position to Facility 249, which is listed as the Public Works Field Office on the 1945 and 1955 NASKA building lists. This wood-framed, gable-roofed building has asphalt roll roofing. The original siding is covered with plywood sheets or asphalt shingles. There are no original doors or windows, having been boarded up or replaced with jalousies.

FACILITY 260 - SWIMMING POOL

The swimming pool at NAS Kahului is located near the Kalialinui drainage ditch and south of Keolani Place (formerly Main Street). It measures 18.3 m (60 ft) wide by 22.9 m (75 ft) long and was originally equipped with three diving boards (*Maui News* Jan. 10, 1948:10). It is now abandoned and partially filled with vegetation (Photo 14). No adjacent bath houses remain. Reuse of the pool for the citizens of Maui County was called for after the Navy's departure from the station, but it may have remained unused after 1946. One plan, for the Catholic Youth Organization to manage the recreation facilities at NAS Kahului, was announced in 1948 (*Maui News* March 17, 1948:1), but it is not clear if this was ever implemented.

HANDBALL COURT

The handball court, which does not have a facility number on any list or map, is located just southwest of the swimming pool (Facility 260). The vegetation growth is so thick surrounding this structure that it prevented both photography and access for close inspection. A concrete wall approximately 4.6 m (15 ft) tall and two sloping buttresses to this wall are all that remain of the structure.

FACILITY 411B - STOREHOUSE FOR OFFICERS' CLUB

The Officers' Club (Facility 411) consists of a complex of buildings along the beach near the east end of the station. The complex includes a snack bar (411A), storehouse (411B), and cook's quarters (411C), as well as a Beach Club Annex (Facility 412) which was

close to the water's edge. The only remaining structure appears to be the storehouse, which is designated Facility 411B on the June 1945 NAS Kahului list. Both the Officer's Beach Club and the Beach Club Annex sustained major damage in the April 1, 1946 tidal wave (*Maui News* April 13, 1946:6); by mid-June, there was a new Officers' Club, "remodeled from the former annex" (*Maui News* June 12, 1946:8). The 1953 and 1954 NASKA maps do not show Facility 412, although they do indicate that Facilities 411, 411A, 411B, and 411D are in this Officers' Club complex. The 1955 NASKA building list shows only Facility 411B.

Facility 411B is a concrete rectangular structure that measures about 4.9 by 7.6 m (16 by 25 ft) in plan, and 2.9 m (9.5 ft) in height (Photo 15). The flat concrete roof is about 26.2 cm (8 in) thick and overhangs the walls by about 6.6 cm (2 in). The doors from the one doorway are missing and there are no windows, only a series of round ventilation holes near the top and bottom of three walls. A concrete wall projects near the door opening.

FACILITY 411 - FOUNDATION OF OFFICER'S CLUBHOUSE

This foundation, located along the beach near the east end of the station, is the most distinctive of those remaining from NAS Kahului. The portion that appears to be slightly raised, and which was probably the interior of the club, is a stained red concrete, while the concrete portion that was an exterior patio, and perhaps dance floor, has inscribed compass markings.

The 1949 NASKA map indicates the building was used as the AJA Clubhouse. AJA probably stands for Americans of Japanese Ancestry; the structure may be associated with the beginnings of increasing influence of this ethnic group in the political and social life of Maui and other Hawaiian islands. After the war, AJA veterans returned to Hawai'i with acclaim for their efforts in World War II and often used their veterans' benefits to gain law and other professional degrees. A local informant remembers the 100th Battalion clubhouse as a Quonset hut on the dune *makai* of the road to the airport; the building was marked with the battalion insignia (R. Tanaka, personal communication).

FACILITY 701 - CONCRETE ROOM AND FOUNDATION

Facility 701 is located parallel to Kaua Street (formerly Paia Avenue) on the southeast side of the airport. The only remaining portions of Facility 701 are the concrete slab foundation and a small concrete room. The building is listed as a Supply Office on the 1945 NASKA maps; it is not shown the 1953 or 1954 NASKA maps. The dimensions of the overall building foundation are approximately 9.2 m (30 ft) by more than 30.1 m (100 ft). Rocks and dirt have been bulldozed onto the east end of the slab. The small concrete room measures about 2.4 by 4.0 m (8 by 13 ft), with a height of about 2.4 m (8 ft) (Photo 16). There is one door opening, but no windows in this room. This room was probably built to hold important supplies or records.

Facilities 771 and 772 - Paint and Oxygen Storage

These two Quonset huts were originally in a complex of three similar buildings off Kaua Street (formerly Paia Avenue) on the southeast side of the airport. They all measured about 6.1 by 15.2 m (20 by 50 ft) in plan, and about 7.3 m (24 ft) in height. Nothing remains of Facility 773, and the burn marks on the wooden end wall of Facility 772 suggest that a fire destroyed it. All three buildings were used for storage of volatile materials. These Quonset huts are set on walls of concrete block about 1.1 m (3.5 ft) tall. One distinctive feature is that the metal siding is not laid in two different directions, as is the norm. All sheets are laid so the corrugations follow the arch. The end wall of Facility 772 is built of shiplap boards, which is also unusual. The metal framing of Facility 771 has almost totally collapsed (Photo 17), and Facility 772 is also in very poor structural condition (Photo 18).

Facility 810 - Warehouse

Facility 810 is located on Eena Street (formerly Service Road) on the southeast side of the airport. This structure is similar to Facility 701, with a concrete slab and a concrete room remaining of the original building. The concrete room on Facility 810 is much larger than the one on Facility 701 (Photo 19). It measures approximately 15.2 by 19.8 m (50 by 65 ft) in plan, and about 4.6 m (15 ft) in height. The overall foundation measures almost 61.0 by 15.2 m (200 by 50 ft). A 3.1 m (10 ft) wide loading platform runs almost the entire length of the building, except where at both ends where ramps slope to ground level. The door opening is 3.1 m (10 ft) wide and about 3.7 m (12 ft) tall. The door is built of wood planks and divided at about the 2.4 m (8 ft) height. Five other openings have been cut into the concrete walls, but the room had no windows originally.

Small Quonset Hut in Area of Former Marine Complex

There is a small Quonset hut (20-foot width type) visible from Kahale Street (formerly Barracks Avenue). This may be a slightly relocated building from the Marine complex (Facilities 302A-302F) that was located between Barracks Avenue and Main Street. Most of the Marine facilities on Maui were housed in Quonset huts or tents (U.S. Navy, Bureau of Yards and Docks 1947). The window and door openings that are visible are not original (Photo 20).

Plane Remnants

Two planes appearing to date from World War II were located in the 1994 assessment survey (Tomonari-Tuggle and Welch 1994). Both are located near the former Officers' Club (Facility 411) near the beach at the east end of the station. These planes were relocated in 1996, and Welch noted that Plane #2 had been heavily vandalized and much less of it remained than had been present in 1990.

Plane #1 (Photo 21) is located just inland of the foundations of the Officers' Club, at the base of the stairway that once led to this building. Based on photographs of the aircraft, it was identified as a SNV-2 Valiant, a Navy training plane manufactured by Vultee Aircraft, Incorporated (Denfeld 1996). In its review of the draft version of this report, the Maui Military Museum (1997) corrected this identification, noting that the plane is a North American F-86E Sabre swept-wing jet fighter; the wing slats of the aircraft remnant indicate that it is the 1951 "E" version.

The remnant of Plane #2 is located further inland from Plane #1. Only a small portion remains (Photo 22). Again, based only on photographs of what little is left of the plane, it was identified as possibly an SNJ-5, another common Navy trainer, manufactured by North American (Denfeld 1996). This type of plane was used at NAS Kahului for flight instruction (*Maui News* June 12, 1946:8). The Maui Military Museum (1997) states that this plane is a North American F-86A Sabre which had been displayed at the Civil Air Patrol building near Kahului Airport in the early 1960s.

Both aircraft had been used for airport fire training exercises in the early 1960s (Maui Military Museum 1997).

V. SIGNIFICANCE EVALUATIONS AND RECOMMENDATIONS

This section of the report presents a general significance evaluation for NAS Kahului and makes recommendations for preservation and for future data recordation to be carried out at the time that individual remains might be impacted by Kahului Airport development.

OVERALL SIGNIFICANCE OF NAS KAHULUI

Kahului Airport is one of the few places on Maui where physical evidence remains of the World War II history of the military in Hawai'i. The structures and foundations left from NAS Kahului (identified as State Site 50-50-05-4197) constitute this evidence. These ruins reflect the expansion of military facilities that was taking place on all the major Hawaiian islands during World War II, as well as their rapid abandonment after the war. The training of personnel and the maintenance of planes that took place here contributed to the Allied victory in World War II.* Further, the installation continued to be used and was altered by civilian agencies and veterans' groups after the war. However, because most post-war events occurred less than 50 years ago and are not of exceptional importance, they do not influence the evaluation of National Register eligibility of the site.

The role of NAS Kahului in World War II might qualify it for the National Register under Criterion A, as a site "associated with events which have made an important contribution to the broad patterns of our history." NAS Kahului was developed as a direct effect of World War II, a significant international event that had tremendous impact on the Maui community. However most of the remains of NAS Kahului are in poor condition and therefore the site no longer meets the integrity criteria for National Register significance (that is, integrity of location, design, setting, materials, workmanship, feeling, and association). The site retains integrity of location, but most buildings and the overall context have been too strongly modified since the end of the war by the development of Kahului and the commercial airport. Only a few individual buildings and a group of buildings retain integrity of design, setting, materials, workmanship, feeling, and association.

SIGNIFICANCE EVALUATIONS OF INDIVIDUAL STRUCTURES

Although the entire complex, Site 50-50-05-4197, and most of the individual site features are not eligible for the National Register; some structures and building complexes may be individually eligible. Therefore, for planning purposes in terms of future airport

* For instance, the exploits of one set of airmen were noted in the *Maui News* on October 13, 1945: Air Group 19, "which staged here during the first months of 1944, is one of the most decorated air groups in the Navy. . . . Raids in which they participated include the attacks against Guam, Palau, the Philippines, the Battle of Leyte Gulf, and the first attacks against Okinawa."

development, the individual NAS Kahului structures were evaluated for significance individually or as parts of smaller groups of structures. These evaluations were then used as the basis for recommendations for mitigation of adverse effects from future airport development.

Table 3 lists structures that are evaluated as eligible to the National Register. These structures include the ammunition magazines in the Kanahā Pond wildlife refuge (including Building 101) and the enlisted men's beach pavilion. These retain sufficient architectural integrity and meet significance Criteria A and C for eligibility. Criterion C is defined as a property that embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic value; or that represents a significant and distinguishable entity whose components may lack individual distinction. The ammunition magazines warrant consideration of eligibility for the National Register as a historic district.

Although Facility 411, the Officer's Club, remains as only a concrete foundation without the architectural integrity of a complete structure, it is considered to be probably eligible for listing in the Hawaii Register and perhaps eligible for the National Register. It includes characteristics that distinguish it from the other buildings of the complex, which follow mostly standardized plans. It was used as a clubhouse for returning AJA (Americans of Japanese Ancestry) veterans in the post-war years, and as such may meet the State of Hawai'i criterion of significance based on historical cultural value to a particular ethnic group.

The remaining structures, foundations, and ruins are not considered eligible for the National Register. The two plane remnants are not considered significant because they have lost their integrity.

Table 3. Facilities of Major Importance to the NAS Kahului Complex, Site 50-50-05-4197.

Facility No.	Facility Function	Comment
101 and 103-117	ammunition magazines	embody distinctive characteristics of types and methods of construction used only during World War II period (NR Criterion C); historic district for ammunition storage complex should be considered
-	EM beach pavilion	architecture is distinctive in its use of local lava rock and double-pitched hip roof style (NR Criterion C); also represents post-World War II history when military personnel were in need of recreational facilities as they awaited discharge

RECOMMENDATIONS

The following recommendations and mitigation measures address federal requirements for compliance with the National Historic Preservation Act (NHPA). All properties that are listed on or declared eligible for inclusion on the National Register of Historic Places (NRHP) are subject to the process established by Section 106 of the NHPA, which requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The Section 106 review process involves five basic steps:

Step 1: Identify and evaluate historic properties. The Federal agency responsible for an undertaking begins by identifying the historic properties that may be affected by the undertaking. If any districts, sites, buildings, structures, or objects are found that may be eligible for inclusion in the NRHP, but have not yet been included in the Register, the agency evaluates them against criteria published by the National Park Service, which maintains the Register. This evaluation is carried out in consultation with the State Historic Preservation Officer (SHPO), and if questions arise about the eligibility of a given property, the agency may seek a formal determination of eligibility from the Secretary of the Interior. The Section 106 process gives equal treatment to properties that are already in the Register and those that are eligible for inclusion.

Step 2: Assess effects. If historic properties that are included in or are eligible for inclusion in the National Register are found, the agency then assesses what effect its undertaking will have on them. Again the agency works with the SHPO, and considers the views of others. The agency makes its assessment based on criteria found in the Council's regulations, and can make one of three determinations:

No effect: the undertaking will not affect historic properties;

No adverse effect: the undertaking will affect one or more historic properties, but the effect will not be harmful;

Adverse effect: the undertaking will harm one or more historic properties.

Step 3: Consultation. If an adverse effect will occur, the agency consults with the SHPO and others in an effort to find ways to make the undertaking less harmful. Consultation is designed to result in a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) which is signed by all consulting parties and outlines agreed-upon measures that the agency will take to reduce, avoid, or mitigate the adverse effect. For example, typical actions that are addressed in an MOA when altering a historic structure include following the Secretary of the Interior's (SOI) *Standards for Rehabilitation* and the SOI *Guidelines for Rehabilitating Historic Buildings*; when demolition or severe alteration of a historic structure is proposed, and less drastic alternatives are not possible, then customary MOA provisions include documentation such as photographic and written documentation, or measured drawings done according to Historic American Building Survey standards. In some cases,

the consulting parties may agree that no alternative, acceptable measures are available, but that the adverse effects must be accepted in the public interest.

If consultation proves unproductive, the agency or the SHPO, or the Council itself, may terminate consultation. The agency must submit appropriate documentation to the Council and request the Council's written comments.

Step 4: Advisory Council comment. The Council may comment during Step 3 of the process by participating in consultation and signing the resulting MOA or PA. Otherwise, the agency obtains Council comment by submitting the MOA or PA to the Council for review and acceptance. The Council can accept the MOA or PA, request changes, or opt to issue written comments. If consultation is terminated, the Council issues its written comments directly to the agency head, as the agency had requested.

Step 5: Proceed. If an MOA or PA is executed, the agency proceeds with its undertaking under the terms of the agreement document. In the absence of an MOA or PA, the agency head must take into account the Council's written comments in deciding whether and how to proceed.

This report constitutes the identification and preliminary evaluation phase of the Section 106 process. The evaluation part of Step 1 can be concluded if the State Historic Preservation Division and the Department of Transportation, Airports Division agree on National Register eligibility of the NAS Kahului remains. If there is disagreement, materials sufficient to make a determination of eligibility must be submitted to the Keeper of the National Register.

PRESERVATION

The ammunition magazines, the Enlisted Men's beach pavilion, and the Officers' Club foundation are recommended for preservation.

The ammunition magazines (Facilities 101 and 103 to 117) are recommended for nomination to the National Register as a historic district. Except for Facility 101, the magazines are located within the confines of the wildlife refuge and, as such, are protected by the sanctuary status. Facility 101 may be impacted by airport project Phase III-8 to expand new ground transportation facilities along Keolani Place. This building should be preserved and reused if possible. Situated at the gateway to the airport, this building would make an excellent facility to interpret the war-time activities of NAS Kahului. If preservation is not possible, the building should be documented according to Historic American Building Survey standards. The extent of documentation will be decided through the consultation process.

The beach pavilion lies outside the airport property boundary and does not fall within the area of any proposed airport project. Adverse effect by airport development is not anticipated.

The Officers' Club foundation will not be affected by proposed airport projects. However, should future airport activity encroach on this site, it should be documented, with the extent of documentation decided through the consultation process. An attempt should be made to contact AJA members who might have used the clubhouse after the war and to gather oral historical data concerning the use of this building at that time.

For the remaining structures and foundations, the information recorded in this report constitutes sufficient mitigative action. Neither preservation nor further data recovery is recommended for those remains.

In conformity with the recommendations outlined in the draft of this document and in the report by Tomonari-Tuggle and Welch (1994), the FAA, Hawai'i State Historic Preservation Officer, and the Advisory Council on Historic Preservation have drafted a Programmatic Agreement outlining the treatment of significant historic properties during airport development. This agreement states that Kanahā Pond (with Facilities 103 to 117) will be preserved in perpetuity. Building 101 and the Building 411 foundation will be preserved in place. If future development plans should result in potential adverse impacts to either of these features, then appropriate architectural data recovery will be conducted.

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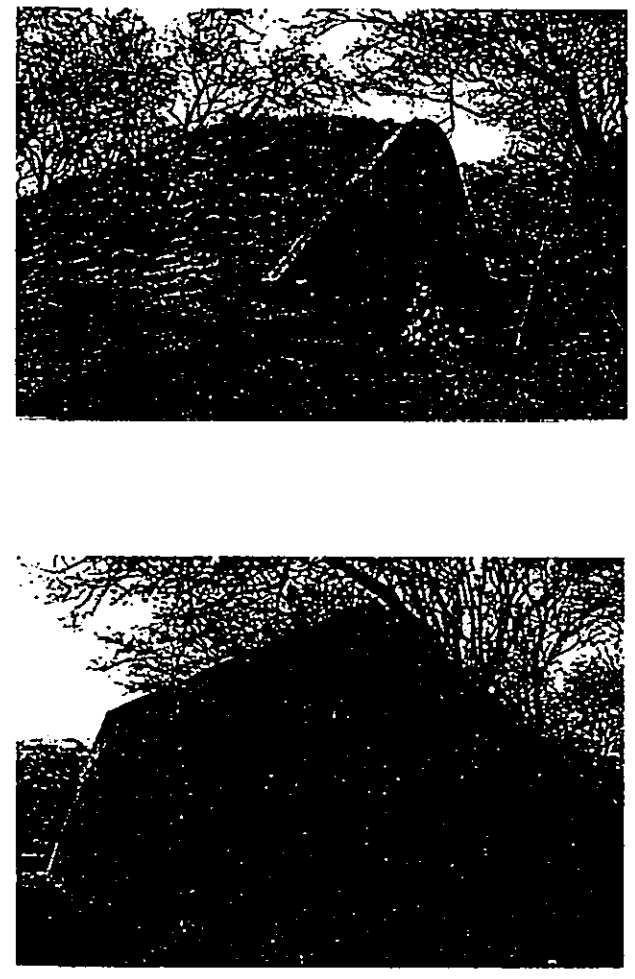


Photo 1. Ammunition Storage Magazine Type 1 - With Blast Wall (Facility 113).

Photo 2. Typical Doors to Ammunition Storage Magazine (Facility 113).

Photo 3. Ammunition Storage Magazine Type 2 - Without Blast Wall (Facility 109).

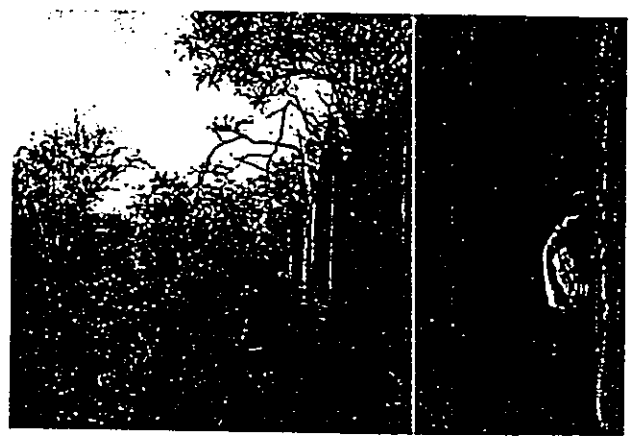


Photo 4. Ammunition Storage Magazine Type 3 - Triple Magazine (Facilities 107 and 108).

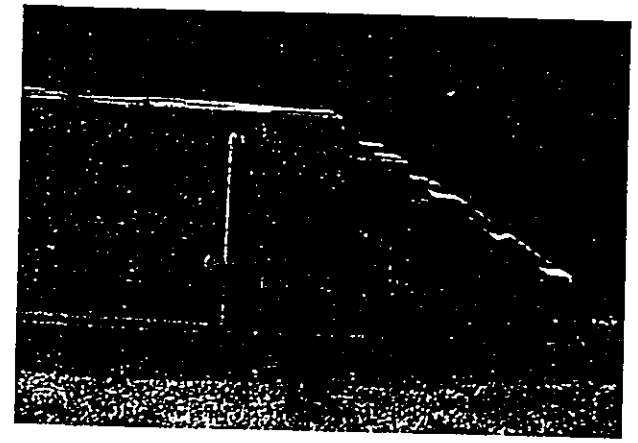
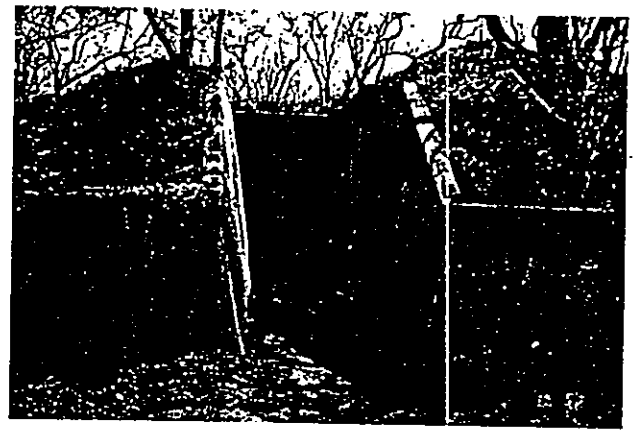


Photo 5. Ammunition Storage Magazine Type 3 - Triple Magazine (Facility 101).



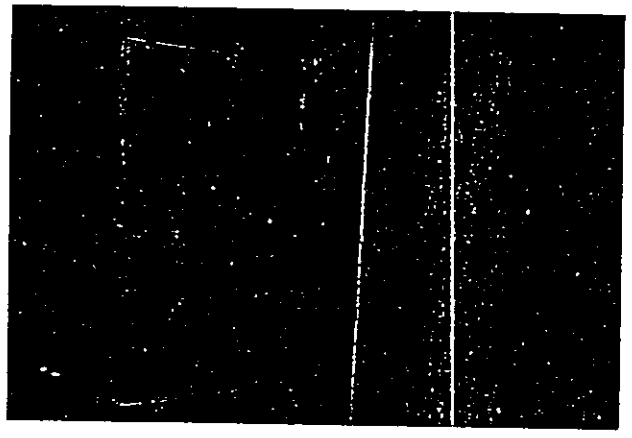
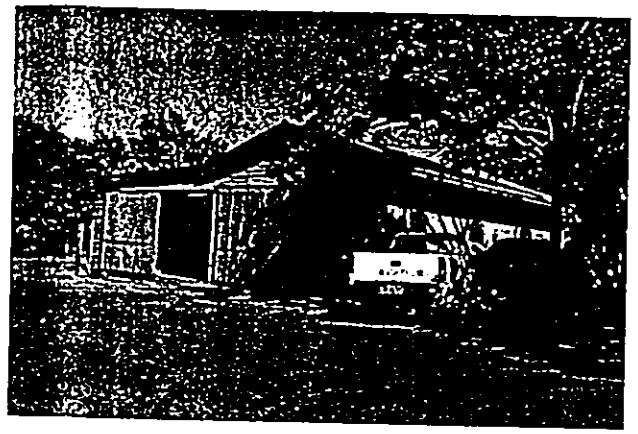


Photo 6. Ammunition Storage Magazine Type 4 - Rectangular Magazine (Facility 104).



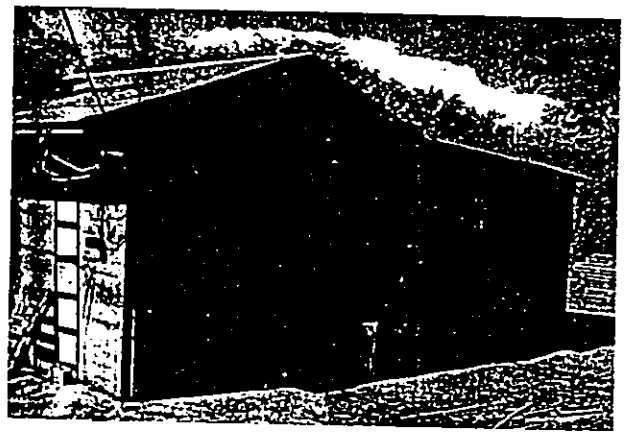
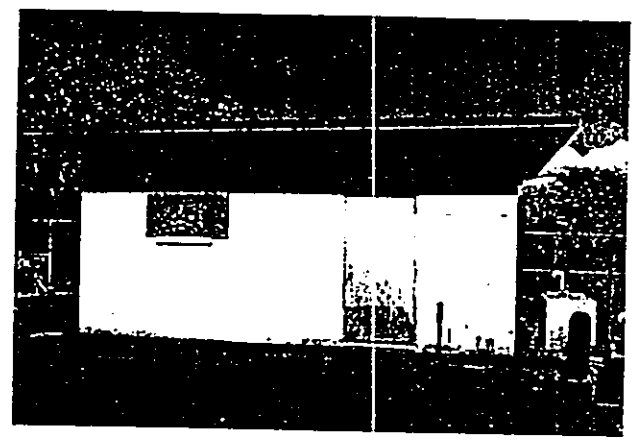


Photo 7. Facility 102.



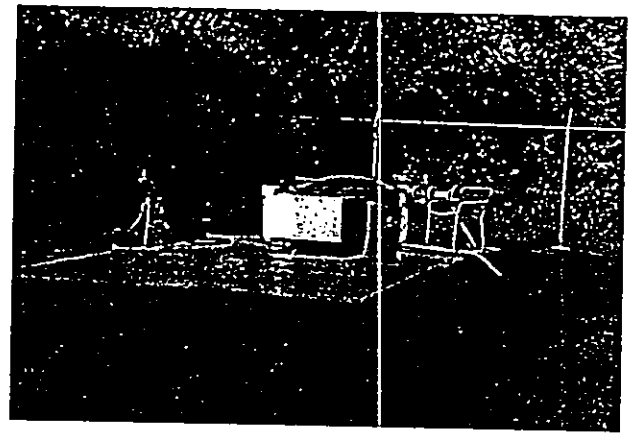
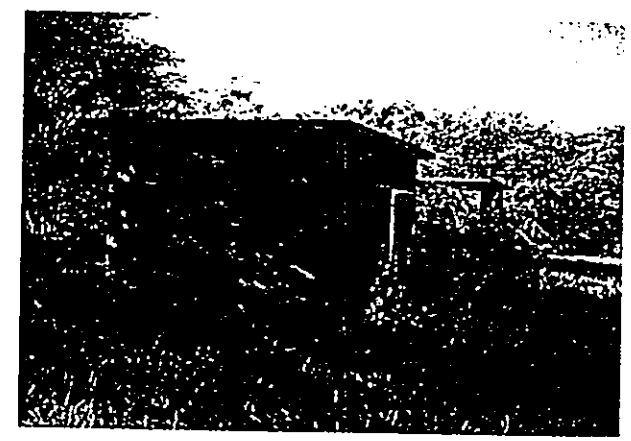


Photo 8. Facility 234 - Water Pumping Plant (modern).



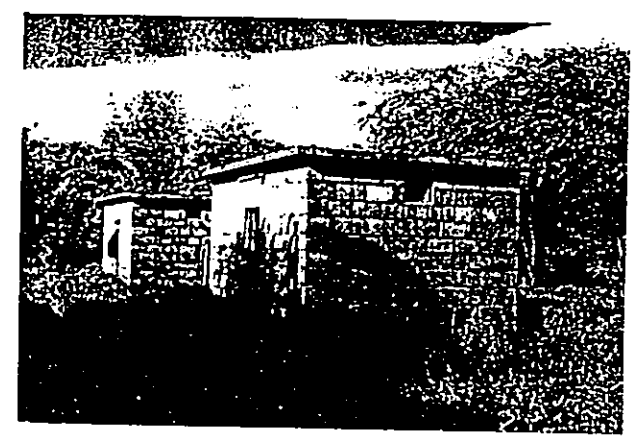


Photo 9. Facility 242 - Four Small Arms Magazines.

Photo 10. Enlisted Men's Beach Pavilion.

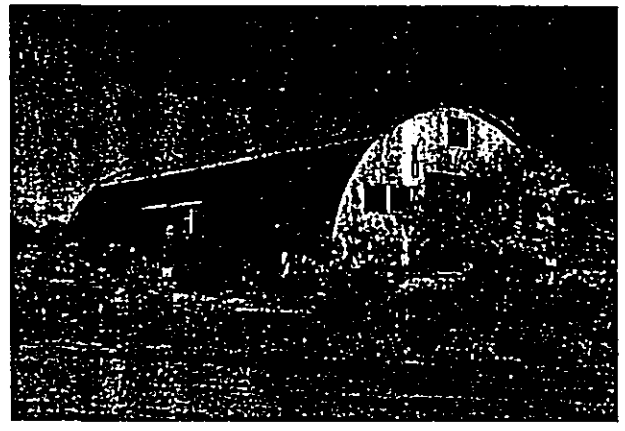


Photo 11. Facility 248A - Large Quonset Hut.

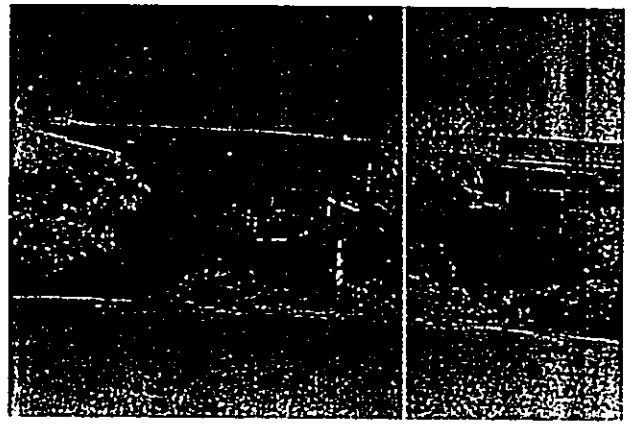


Photo 12. Facility 248C - Office.

Photo 13. Facility 249 - Public Works Field Office.

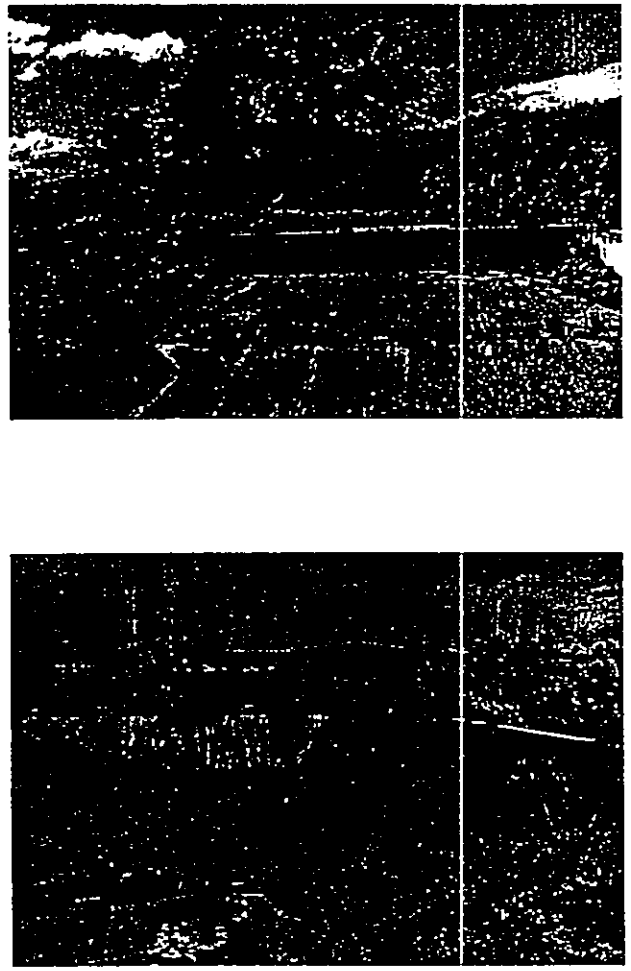


Photo 14. Facility 260 - Swimming Pool.

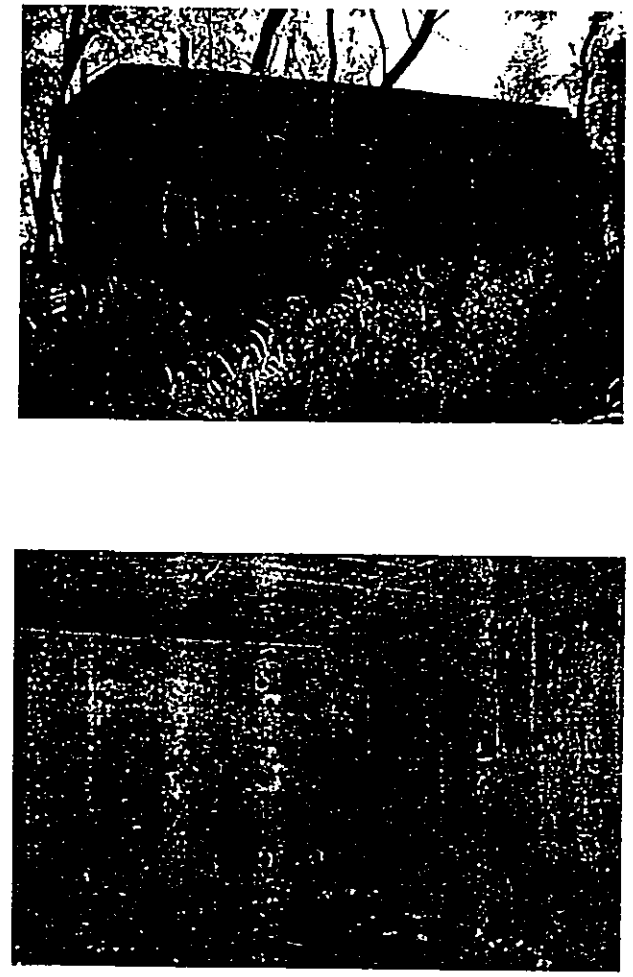


Photo 15. Facility 411B - Storage Building near former Officer's Club.

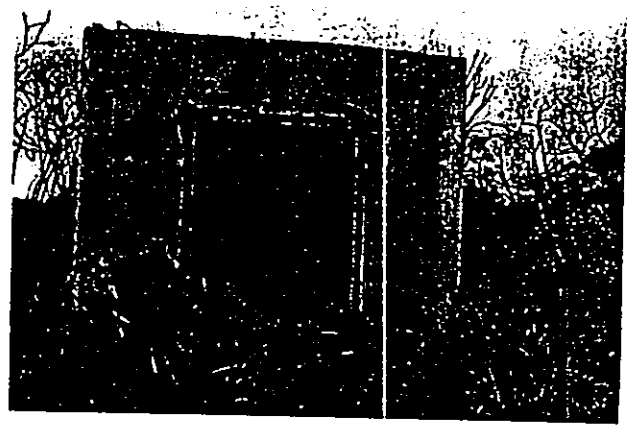


Photo 16. Facility 701 - Concrete Room and Foundation.

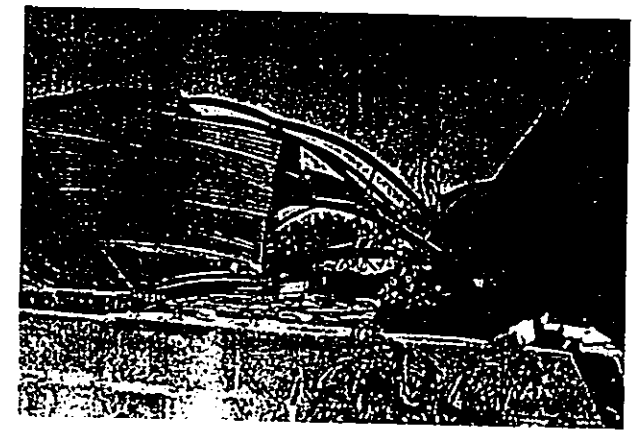


Photo 17. Facility 771 - Paint Storage.

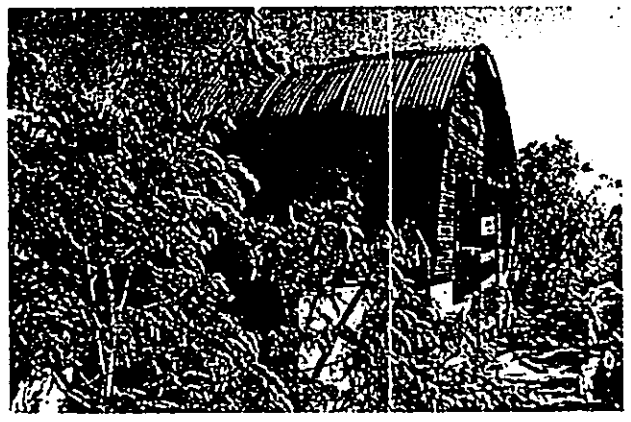
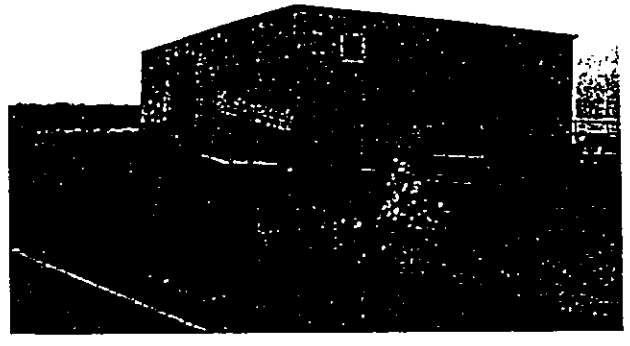


Photo 18. Facility 772 - Oxygen Storage.



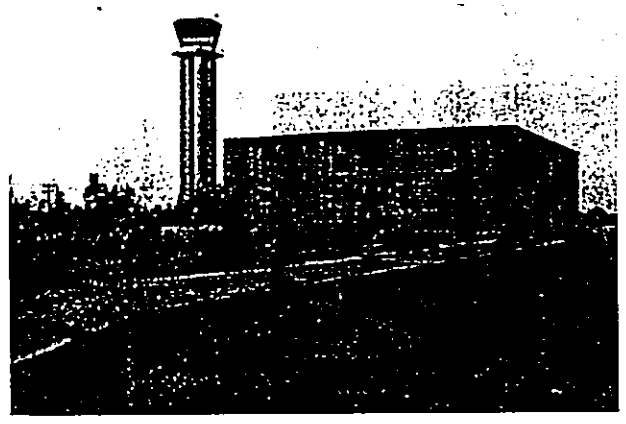


Photo 19. Facility 810 - Storehouse.

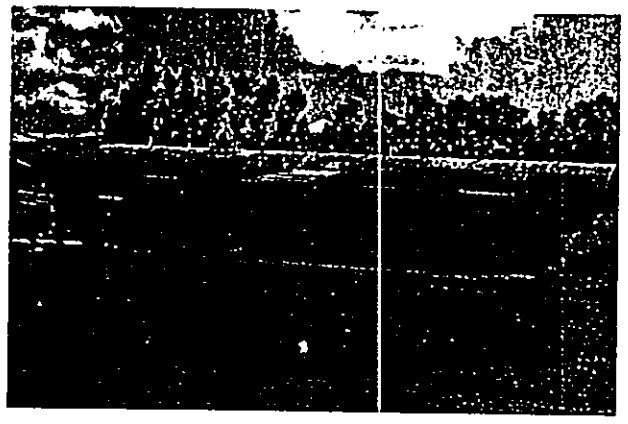


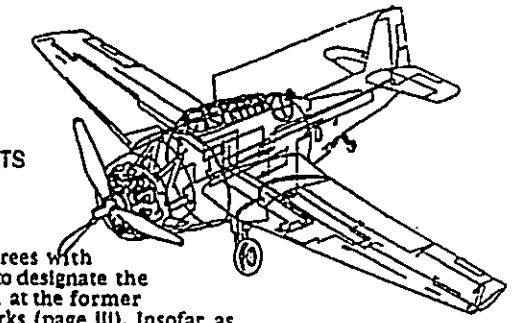
Photo 20. Small Quonset Hut in area of Former Marine Complex.

Photo 21. Plane Remnant #1.

Photo 22. Plane Remnant #2.

APPENDIX.

MAUI MILITARY MUSEUM REVIEW LETTER



Dr. Sara Collins
RE: DLNR SHPO NASKA COMMENTS

The Maui Military Museum agrees with the Executive Summary conclusion to designate the identifiable buildings which remain at the former Naval Air Station as historic landmarks (page iii). Insofar as housing or service ramps of either the former 10th Amphibious (AMTRAC) Battalion bivouac at Ma'alaea, and the UDT camps along the Kamaole coastline have long been erased; the WWII vintage structures of both Naval Air Stations Pu'unene and Kahului are the sole remnants of the intense period of naval aviation which distinguished Maui as the first "Top Gun" training site for the U.S. Navy.

Information relevant to the "Historic Context of Naval Air Station, Kahului" (page 7), includes the "Inter-Island Airways" passenger and air mail service to Ma'alaea Bay by float plane. Sikorsky S-38 twin-engined aircraft, according to L.J. Crampon in his book "Aerophilatelic Flights Hawaii and Central Pacific 1913-1946" (Nov. 1980, Hawaiian Philatelic Society) inaugurated this service beginning November 11, 1929. Mail was delivered to Ma'alaea and carried overland to Wailuku for postal distribution. According to the recollections of Maulan Norman Saito, a retired civil engineer, the transition to the "mudflat" Ma'alaea runway occurred between 1936 and 1937. Most all passengers were still carried by seaplane on Inter-Island Airways S-43 Sikorsky "Baby Clippers", which were put into service December 23, 1935. Until the new DC-3 arrived, the traveling public of Hawaii regarded flying boat aircraft as the safest, or perhaps even the only way to fly. The Department of the Navy had already funded the transitional PBY-5A amphibious patrol plane from Consolidated in 1939, but civilians flying interisland routes first boarded the reliable DC-3 in September, 1941 and were treated to three months of land-based travel. Civilians were required to use steamship transport for the duration of WWII.

In December of 1938, the Hepburn Board, appointed by the Secretary of the Navy, reported on its survey of the aviation shore establishment. Recognizing the demands that would have to be met if the approach of war should precipitate a great expansion, the Board recommended for aviation the enlargement of 11 existing stations and the erection of 16 new ones, including Kaneohe, Midway, Wake, Guam, and five other Pacific Islands. The Army had already been hard at work constructing Hickam Field following Presidential approval in September of 1935, of the Army-Navy joint use of aviation facilities agreements.

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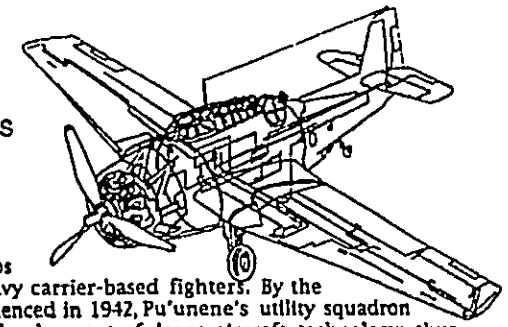
PHONE: (808) 573-1573 (HAWAII STANDARD TIME) • FACSIMILE: (808) 572-2443



In this way, the airport facilities developed at Pu'unene were to serve both the Army Air Corps land-based bombers, as well as the Navy carrier-based fighters. By the time NAS Kahului construction commenced in 1942, Pu'unene's utility squadron VJ-3 shifted toward the accelerated development of drone aircraft technology; thus forming the basis for future Navy guided missile programs. NAS Kahului maintained carrier air group training which was begun at Pu'unene, and together, these Maui aerodromes trained in coordinated sorties with the Oahu-based Army Air Forces over the Kaho'olawe restricted bombing range. As the war progressed, Army B-17's and B-24's programmed to use the Navy facilities on Maui were diverted to forward bases in the South Pacific for advanced training.

According to the official on-base newspaper, "The Fly Paper", at NAS Kahului, the Japanese surrender came as the station was being rapidly expanded to handle four air groups. New sets of barracks, bachelor officer's quarters, and galleys were completed but never used. Military dependents, and even civilians quickly moved into these newly available quarters through December, 1946. Remaining air groups began decommissioning, with material roll-up and disposal of excess stocks through March, 1947. (In October 1945, the NAS newspaper "The Fly Paper" was changed to "The Flyer", and the last issue was printed June 29, 1946.) (As an additional note: the files of Olivia R. Pacheco, which include the complete run of base newspapers, daily memos, and weekly announcements for NAS Kahului, are now archived by the Maui Military Museum.)

As early as May 28, 1947, the Maui News referred to NAS Kahului as a future "Ghost Town", and urged local businessmen to petition the U.S. Government to allow civilian conversions of base facilities such as the bakery, theater and the various sports complexes. On October 15, 1947, NAS Kahului was deactivated and the Territory of Hawaii assumed ownership of the property. What remains of historical interest concerning the deactivation of NAS Kahului, is the lone existing bunker which is situated along the present Kahului Airport access highway.

Noted within the Draft Architecture and Archeology Report for NAS Kahului as Facility No. 101 (as per Table 2, page 23), the directors of the Maui Military Museum concur with the assessment made for the preservation of this storage bunker. The Board of Directors for the Maui Military Museum, Inc., have been actively searching for a permanent location to display military artifacts of WWII. Under the terms of the Federal NHPA Section 106 regulations (36 CFR 800), the significance of an existing WWII site which could serve as an interpretive center for Maui's wartime history is of great interest to our Board. With the direction of

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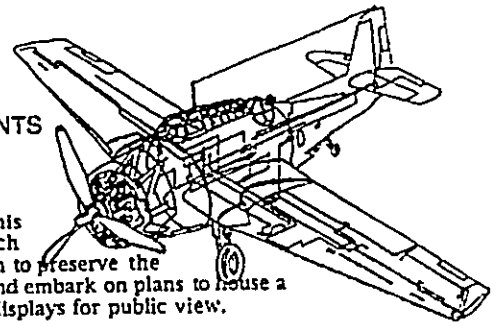

your office, the terms of the State's Chapter 6E could be used to designate this bunker as a historic property. With such direction, the Museum could take action to preserve the existing bunker from further decay, and embark on plans to house a permanent collection of interpretive displays for public view.

Of further note concerning the Draft Architecture and Archeology Report for NAS Kahului, is the description given to two aircraft remnants in paragraph 6, on page 30. Mr. Alan DeCoite, of the Museum, has a thorough working knowledge of both aircraft, and he would like to correct the Report's description of the two aircraft as being from WWII, which they are not.

Mr. DeCoite took me to examine the aircraft, and pointed out the features which identify the aircraft in Report Photo #21 as a North American F-86E "Sabre" swept-wing supersonic jet fighter with a wingspan of 37 feet, one inch (which we measured to be true). Mr. DeCoite referred to the wing slats of the wings of this aircraft remnant to identify it as the 1951 "E" version. Mr. DeCoite identified the aircraft depicted in Report Photo #22 as a North American F-86A "Sabre", which had been on display at the Civil Air Patrol building en route to the Kahului Airport circa 1960-65. Both aircraft had been used as "fire trainers" for the crash tenders and personnel at the Kahului Airport in the intervening years.

Ms. Theresa Donham, Bee Burgett, Gary, Alan and I will be meeting soon to outline the progress report for the Pu'unene excavation. I am putting together further oral testimony from Maulans who remember the site and its use as a military disposal site, and the reports continue to conflict. Our Museum will forward its opinion to your office as to the viability of continuing the soil test procedures at the Pu'unene site. Our findings so far regarding the disposal of surplus military hardware at the site are not favorable, even after finding some large vehicle and aviation components in the military "dump" area of the site.

We of the Maui Military Museum thank you for your support of our efforts to uncover the mystery of the Pu'unene site. The amount of time you spent at our site during your last visit in March was very much appreciated, as well as your support of Ms. Donham's expertise on the sitework and survey methodology. Had our soil testing phase revealed aviation assets as per the period historical photos, the terms of the approved data recovery plan would have been a reliable outline for the excavation to continue. However, the present excavation site will yield much new data on the site history of Pu'unene, and the excavation team will decide whether further testing is called for. The consensus must be unanimous on this point, and I will rely entirely on our Board of Directors to render an opinion based on the data as presented by our (soon-to-be-worked-on) progress report.

THE
MAUI MILITARY MUSEUM INC.
POST OFFICE BOX 486, MAKAWAO, MAUI, HAWAII 96768

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PROGRAMMATIC AGREEMENT
REGARDING THE DEVELOPMENT OF KAHULUI AIRPORT, KAHULUI, HAWAII,
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR PART 800.13

WHEREAS, The Federal Aviation Administration (FAA), has determined that the proposed improvements to the Kahului Airport (OGG) by the State of Hawaii, Department of Transportation (HDOT), an undertaking requiring the FAA's environmental approval, will have an effect on known historic properties, including Sites 1777, 1798, 1799, 2849, and Buildings 101, and 411 of the former Naval Air Station Kahului (NASKA), determined to be eligible for inclusion in the National Register of Historic Places; and

WHEREAS, Kanaha Pond (Site 1783 shown on Figure 1) is a historic fishpond within the Kahului Airport boundary, which is contiguous to, but not part of, the project area and under the control of the Hawaii Department of Land and Natural Resources, shall be preserved in perpetuity and no construction shall occur within or adjacent to its boundaries; and

WHEREAS, the FAA has determined that proposed improvements to the Kahului Airport (OGG) by HDOT include areas where it has yet to be determined if historic properties eligible for inclusion in the National Register of Historic Places are present and, if present, if the undertaking will have an effect on such properties; and

WHEREAS, the undertaking will take place in three phases from the years 1997 to 2016; and

WHEREAS, the FAA has consulted with the Hawaii State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the Hawaii Department of Transportation, as the owner and operator of the Kahului Airport, has participated in the consultation and has been invited to concur with this Programmatic Agreement (PA);

WHEREAS, the FAA has consulted with the Maui/Lanai Islands Burial Council, the Office of Hawaiian Affairs, and Hui Malama I Na Kupuna O Hawaii Nei; and

WHEREAS, the Maui/Lanai Islands Burial Council and the Office of Hawaiian Affairs have been invited to concur with this PA;

NOW, THEREFORE, the Advisory Council on Historic Preservation (ACHP), the FAA and the Hawaii SHPO, as signatories to this Programmatic Agreement, agree that the undertaking shall be implemented in accordance with the stipulations listed below in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

The FAA will ensure mitigation will be implemented at historic properties within the Kahului Airport's present and future boundaries in relation to the appropriate project development phase, as specified in the following stipulations:

1. Phase 1 (Figure 4)(Present to Year 2002): The following measures will be taken to identify eligible historic properties, and to preserve or mitigate effects:

A. Site 1798 (burial and non-burial areas shown on Figure 1) will be preserved as a Preservation Area in perpetuity. FAA shall ensure that HDOT prepare an acceptable Burial Preservation Plan which will cover both burial and non-burial areas, in consultation with the Maui/Lanai Islands Burial Council and reviewed and approved by the SHPO, shall be implemented in its entirety. The Site will be marked to designate it as a Preservation Site with an adequate buffer zone. HDOT will construct a berm to divert water runoff from the airport to protect this site. Additionally, the Site will be detailed on the Airport Layout Plan to denote the Preservation Site and buffer zone.

2. Phase 2 (Figure 5)(Year 2003 to Year 2008): The following measures will be taken to identify eligible historic properties, and to preserve or mitigate effects:

A. Building 411 (Officers Club foundation shown on Figure 3) will be preserved in place. FAA shall ensure that HDOT develop an acceptable preservation plan to ensure protection. The SHPO shall review and approve this plan. If the preservation of Building 411 is incompatible with proposed construction of the Emergency Roadway to connect Alahao Street with Old Stable Road, the FAA shall consult with the SHPO and the ACHP to determine if avoidance of the site is possible or whether architectural data recovery in accordance with the Secretary of the Interior's Historic American Building Survey Standards is appropriate.

B. Site 1799 (scattered, unstacked small basalt boulders shown on Figure 1).

(1) This site will undergo further archaeological survey in the form of subsurface testing in order to determine its function. An acceptable report documenting the results of additional testing shall be submitted to the SHPO for review and approval by HDOT through the FAA.

(2) HDOT will preserve Site 1799 in place, with an appropriate buffer zone. FAA shall ensure that HDOT develop an acceptable preservation plan to ensure protection. HDOT shall submit this plan through the FAA to the SHPO for review and approval.

(3) Should the proposed construction of the Emergency Roadway to connect Alahao Street with Old Stable Road affect Site 1799, FAA shall consult with the SHPO and the ACHP to determine if avoidance of the site is possible or whether archaeological data recovery is appropriate.

C. Land to be acquired for the future parallel runway was formally under sugar cane cultivation. No land use changes or construction are planned until Phase 3 (see Stipulation 3.D below); however, should the proposed phasing of the parallel runway change, FAA shall notify the SHPO and the ACHP of its request to change the mitigation status of this property.

3. Phase 3 (Figure 6)(Year 2009 to Year 2016): The following measures will be taken to identify eligible historic properties, and to preserve or mitigate effects:

A. Building 101 (Ammunition Magazine shown on Figure 3)

(1) This building will be preserved in place and could possibly be reused as part of the expansion to the Ground Transportation Facilities. FAA shall ensure that HDOT develop an acceptable preservation plan to ensure protection. HDOT shall submit this plan through the FAA to the SHPO for review and approval.

(2) Should the proposed expansion of the Ground Transportation Facilities adversely affect Building 101, FAA shall consult with the SHPO and the ACHP to determine if avoidance of the adverse effect is possible or whether architectural data recovery in accordance with the Secretary of the Interior's Historic American Building Survey Standards is appropriate.

B. Site 1777 (buried cultural deposit shown on Figure 1) is on land to be acquired for upgrading the Runway Safety Areas for the proposed parallel Runway 2R/20L.

(1) HDOT will preserve Site 1777 in place, with an appropriate buffer zone. FAA shall ensure that HDOT develop an acceptable preservation plan to ensure protection. HDOT shall submit this plan through the FAA to the SHPO for review and approval.

(2) Should the proposed Runway Safety Area affect Site 1777, FAA shall consult with the SHPO and the ACHP to determine if avoidance of the site is possible or whether archaeological data recovery is appropriate.

C. Site 2849 (subsurface cultural deposits shown on Figure 1) may be adversely affected by upgrading the Runway 5/23 Safety Area.

(1) If it will not be adversely affected, then FAA shall ensure that HDOT develop an acceptable preservation plan to ensure protection. HDOT shall submit this plan through the FAA to the SHPO for review and approval.

(2) If the site will be adversely affected, then archaeological data recovery work shall occur at Site 2849. FAA shall ensure that HDOT develop an acceptable data recovery plan. HDOT shall submit this plan through the FAA to the SHPO for review and approval. The SHPO must verify in writing to FAA the successful execution of this plan before any ground disturbance may begin.

D. Phase 3 infrastructure improvements and the proposed parallel Runway 2R/20L will impact the area of cane fields to the east and southeast of the existing airport. Also, four plantation camps (Middle Village 3, Lower Village 3, Japanese Village 1, and Russian Village on Figure 2) were located in these areas. Prior to any ground disturbance (including grubbing and grading), the following mitigation measures will be taken:

(1) HDOT shall ensure that a subsurface archaeological inventory survey shall be undertaken by a qualified archaeologist to determine if historic properties remaining from the four camps are present and would meet the criteria for inclusion in the National Register of Historic Places. An acceptable report of this survey, meeting the SHPO's minimal standards, shall be submitted to the SHPO for review and approval by HDOT through the FAA.

(2) If eligible historic sites are found, FAA shall ensure that HDOT develop an acceptable mitigation plan. HDOT shall submit this plan through the FAA to the SHPO for review and approval. The SHPO must verify in writing to FAA the successful execution of this plan before any ground disturbance may begin.

4. Through preconstruction meetings, HDOT will ensure that project personnel (State inspectors and contractor work forces) are sensitive to the cultural and research significance of historic properties and burial sites, as defined by Hawaii Revised Statutes Chapter 6E-2.

5. To ensure adequate archeological monitoring of construction work, the HDOT will incorporate: Archaeological and Paleontological Findings (Attachment 1), taken from the State standardized special provisions, into the construction contract. A monitoring report will be prepared and submitted to the SHPO for review and approval.

6. In the event human remains and burial goods are discovered during archeological or construction work, treatment and disposition of such human remains and burial goods, including those determined to be of native Hawaiian ethnicity, will be in accordance with Hawaii Revised Statutes Chapter 6E-43.

7. All archeological work performed under this PA will be directed by a professional archaeologist who meets the minimum qualifications set forth on the Department of the Interior's "Professional Qualifications" Guide.

8. All final archaeological reports resulting from actions pursuant to this PA will be provided to the signatories to this PA. All such reports will be responsive to contemporary professional standards identified in the Department of the Interior's "Format Standards for Final Reports of Data Recovery Programs". Precise locating data may be provided in a separate appendix, if it appears that release of such information could jeopardize the integrity of archeological sites.

9. The SHPO will designate an appropriate institution for the proper curation of all recovered materials, field notes, and records which result from the actions covered by this PA; the disposition of recovered human remains and associated burial goods will be in accordance with Hawaii Revised Statutes Chapter 6E-43. Curation costs shall be the responsibility of HDOT.

10. The ACHP and the SHPO may monitor activities carried out pursuant to this PA, and the ACHP will review such activities if so requested. The FAA will cooperate with the ACHP and the SHPO in carrying out their monitoring and review responsibilities.

11. Any party to this PA may request that it be amended, whereupon the parties will consult in accordance with 36 CFR Section 800.13 to consider such amendment.

12. In the event the FAA does not carry out the terms of this PA, the FAA will comply with 36 CFR Section 800.4 through 800.6 with regard to individual undertakings covered by this PA.

13. Should a signatory or any member of the public object to this plan or any action proposed under the terms of this PA, HDOT will consult with the objecting party to resolve the objection. If HDOT finds that the dispute cannot be resolved after a reasonable period, HDOT will notify the FAA and SHPO of the dispute. Within fifteen (15) days of the receipt of the notice of the dispute, the FAA shall forward all documentation relevant to the dispute to the ACHP. Within thirty (30) days after receipt of all pertinent documentation, the ACHP will either:

A. provide the FAA with recommendations, which the FAA will take into account in reaching a final decision regarding the dispute; or

B. notify the FAA that it will comment pursuant to 36 CFR 800.6(b), and proceed to comment. Any ACHP comment provided in response to such a request will be taken into account by the FAA in accordance with 36 CFR 800.6(c)(2) with reference to the subject of the dispute.

Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute; the FAA's responsibility to carry out all actions under this PA, that are not subjects of the dispute, will remain unchanged.

14. Any party to this PA may terminate it by providing thirty (30) days written notice to other signatories to this PA, provided that the parties use their best efforts to consult to resolve the dispute during the period prior to the termination to seek agreement on amendments or other actions that avoids termination of this PA. The party desiring to terminate this PA shall provide evidence to the other parties of this PA that the reason for termination is reasonable and justified pertaining to the specific stipulations of this PA. In the event that the PA is terminated, the FAA will comply with the requirements of 36 CFR 800.4 through 800.6.

Execution of this Programmatic Agreement and implementation of its terms provides evidence that the FAA has satisfied its Section 106 responsibilities for all individual undertakings of the program.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: _____ Date: _____

FEDERAL AVIATION ADMINISTRATION

By: _____ Date: _____
Manager, Airports Division, Western-Pacific Region

HAWAII STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: _____
Hawaii State Historic Preservation Officer

CONCUR

HAWAII DEPARTMENT OF TRANSPORTATION

By: _____ Date: _____

Title: _____

CONCUR

MAUI/LANAI ISLANDS BURIAL COUNCIL

By: _____ Date: _____

Title: _____

CONCUR

OFFICE OF HAWAIIAN AFFAIRS

By: _____ Date: _____

Title: _____

ATTACHMENT 8

Archeological and Paleontological Findings

"The State will retain the services of a qualified Archeologist who will be at the job site whenever clearing and grubbing operations are underway. The Archeologist will observe the clearing operations, and whenever the Contractor encounters findings deemed by the Archeologist to have possible archeological or paleontological value, the Archeologist will so advise the Engineer. The Engineer will temporarily suspend operations that may disturb such findings, and the Archeologist will notify the State Historic Preservation Officer (SHPO) for further direction.

The SHPO will determine whether an archeological discovery is significant and worthy of further investigation, and will so advise the Archeologist and the Engineer. If a site has been discovered which requires further investigation or salvage, as determined by the SHPO, the Archeologist will determine the limits of the site, and will determine, in a timely manner with the Engineer, the best means for protecting the site from any further disturbances. Protection may include barricades, roping off, temporary fencing or other means.

The Contractor shall provide the protective measures, as directed. Payment for items of work that have contract prices will be made under the applicable contract prices. The proposal also contains an item for 'Protective Measures for Archeological and Paleontological Findings' with a Force Account allowance to cover the costs of all items not covered by contract unit prices, but considered necessary for the completion of the protective work. Removal of the protective measures shall also be paid on a Force Account basis, and the Force Account allowance will apply to removal of all protective measures provided under this subsection. The State will bear all costs for the investigations or salvage.

As directed by the Engineer, the Contractor may be allowed to continue any operation which would not further disturb the site(s); however, all work within the protected area shall be suspended until the Engineer is notified by the SHPO that all investigations or salvage operations have been completed. Such temporary suspension of work shall not be attributable to the Contractor as provided under the Subsection regarding Temporary Suspension of Work."

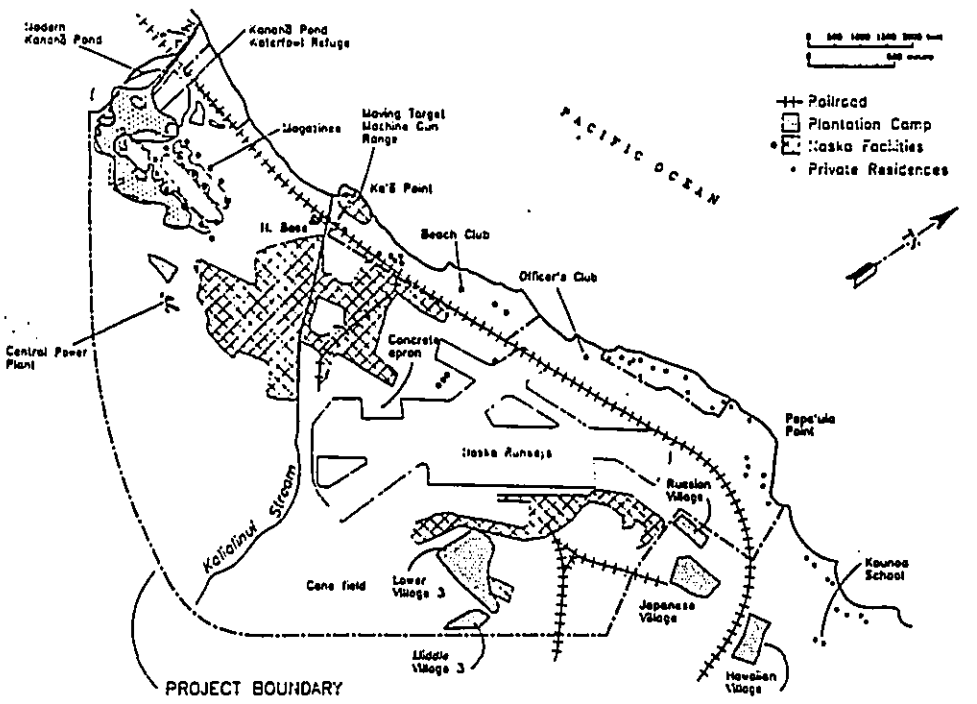


Figure 2 The Project Area in the Early 1950s.

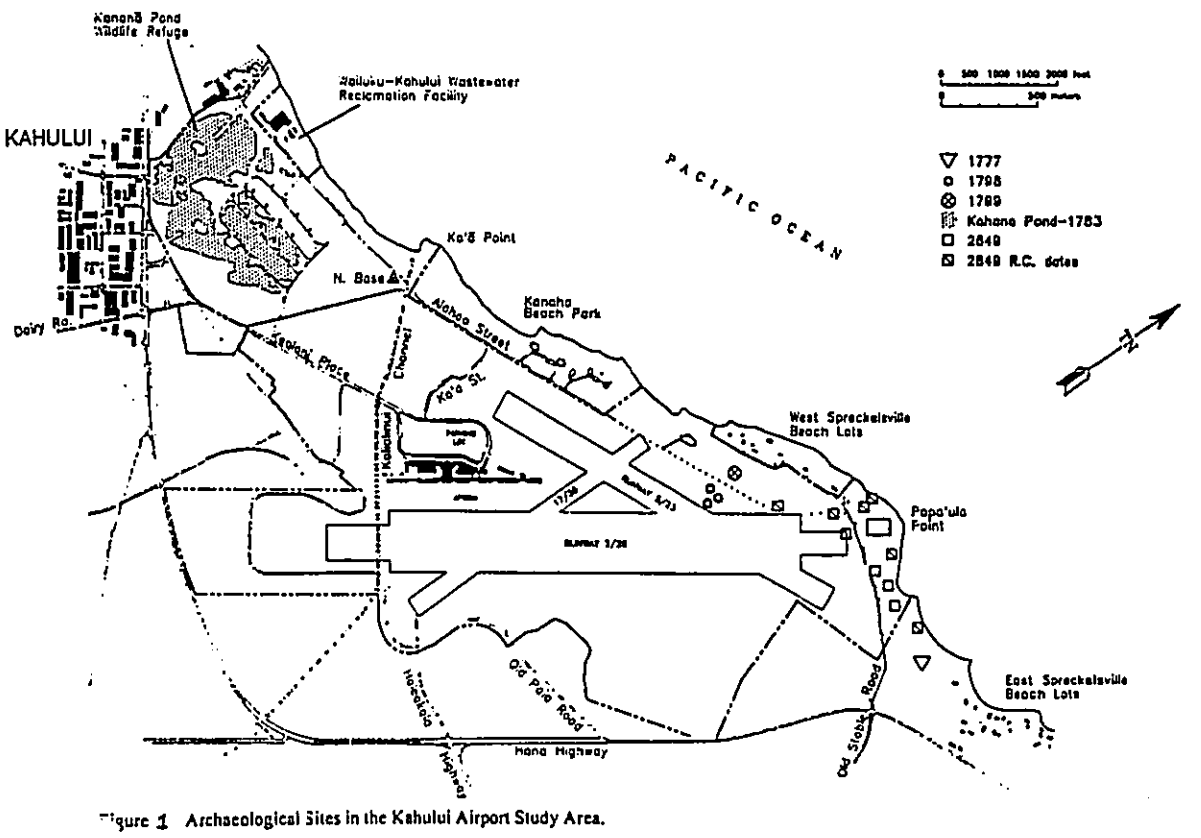


Figure 1 Archaeological Sites in the Kahului Airport Study Area.

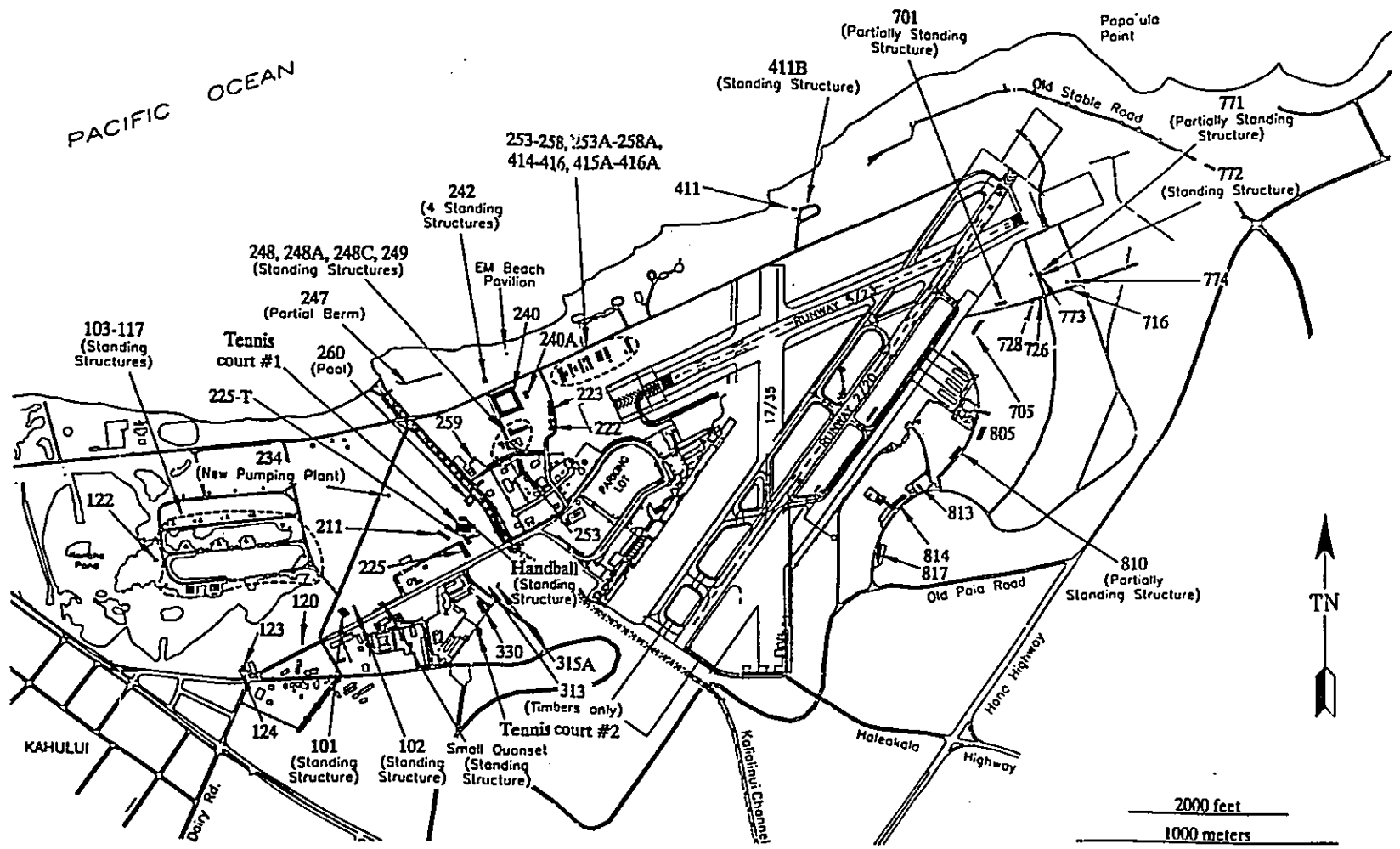
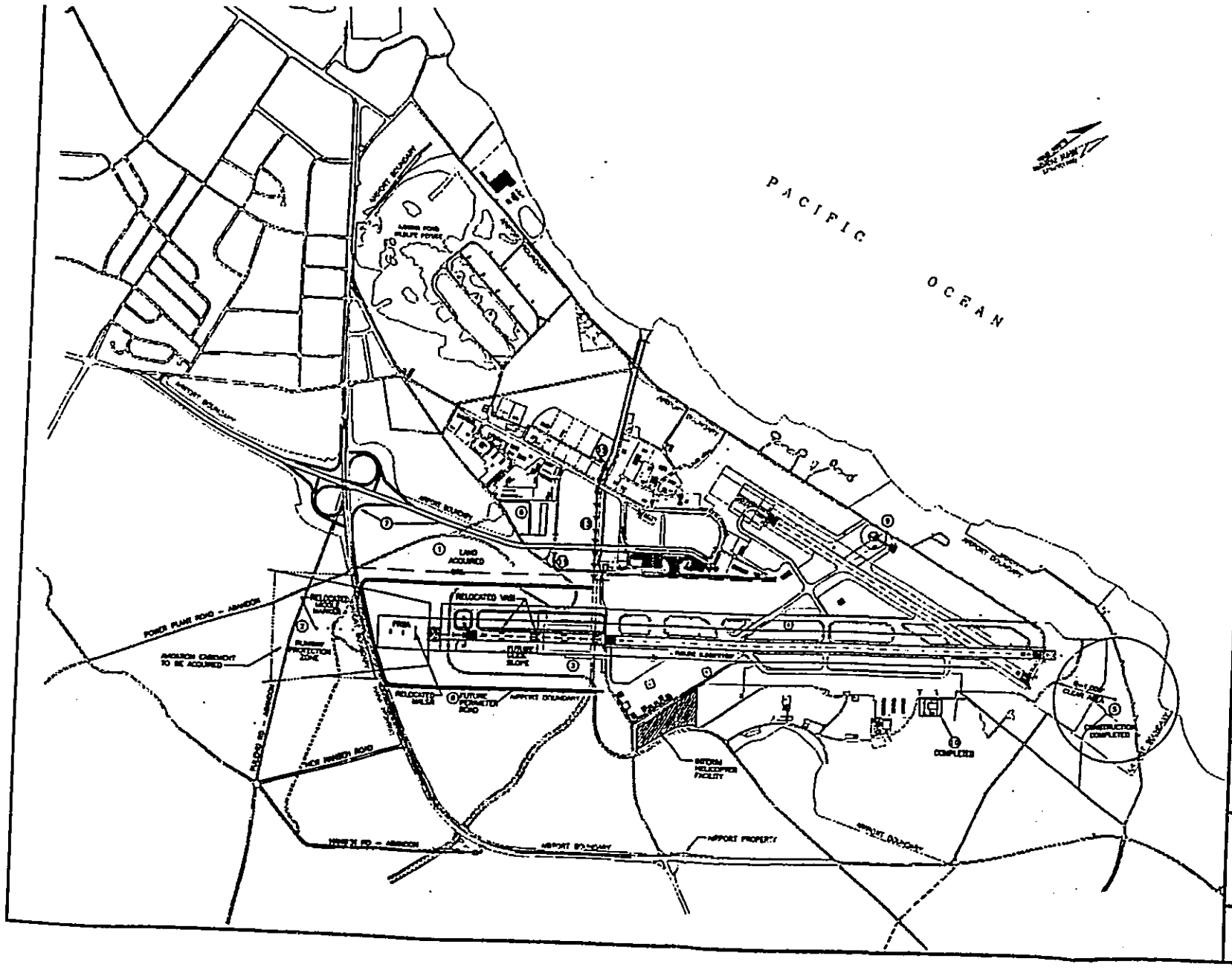


Figure 3 NAS Kahului buildings and foundations that remain, in the context of modern features.



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1 LAND FOR THE AIRPORT ACCESS ROAD AND INTERCHANGE COMPLETED
2 AVIGATION EASEMENT FOR PORTION OF RUNWAY 3 PROTECTION ZONE BEYOND OF MAIN HIGHWAY
3 EXTEND RUNWAY 5-23 TO 5,000 FEET WITH ASSOCIATED TAXIWAYS AND RELOCATE NAVAIDS
4 REMOVE AND STRENGTHEN EXISTING RUNWAY 3-21
5 RELOCATE VORTAC CONSTRUCTION COMPLETED
6 CONSTRUCT CARGO FACILITIES INCLUDING ACCESS ROAD
7 AIRPORT ACCESS ROAD AND INTERCHANGE
8 PERIMETER/SERVICE ROAD AND FENCING
9 ARFF TRAINING FACILITY REMOVE DEBRIS
10 ARFF FACILITY COMPLETED
11 POST OFFICE SAMP ACCESS ROAD
12 BULK FUEL STORAGE TANKS
13 INTERMEDIATE FUEL PIPELINE

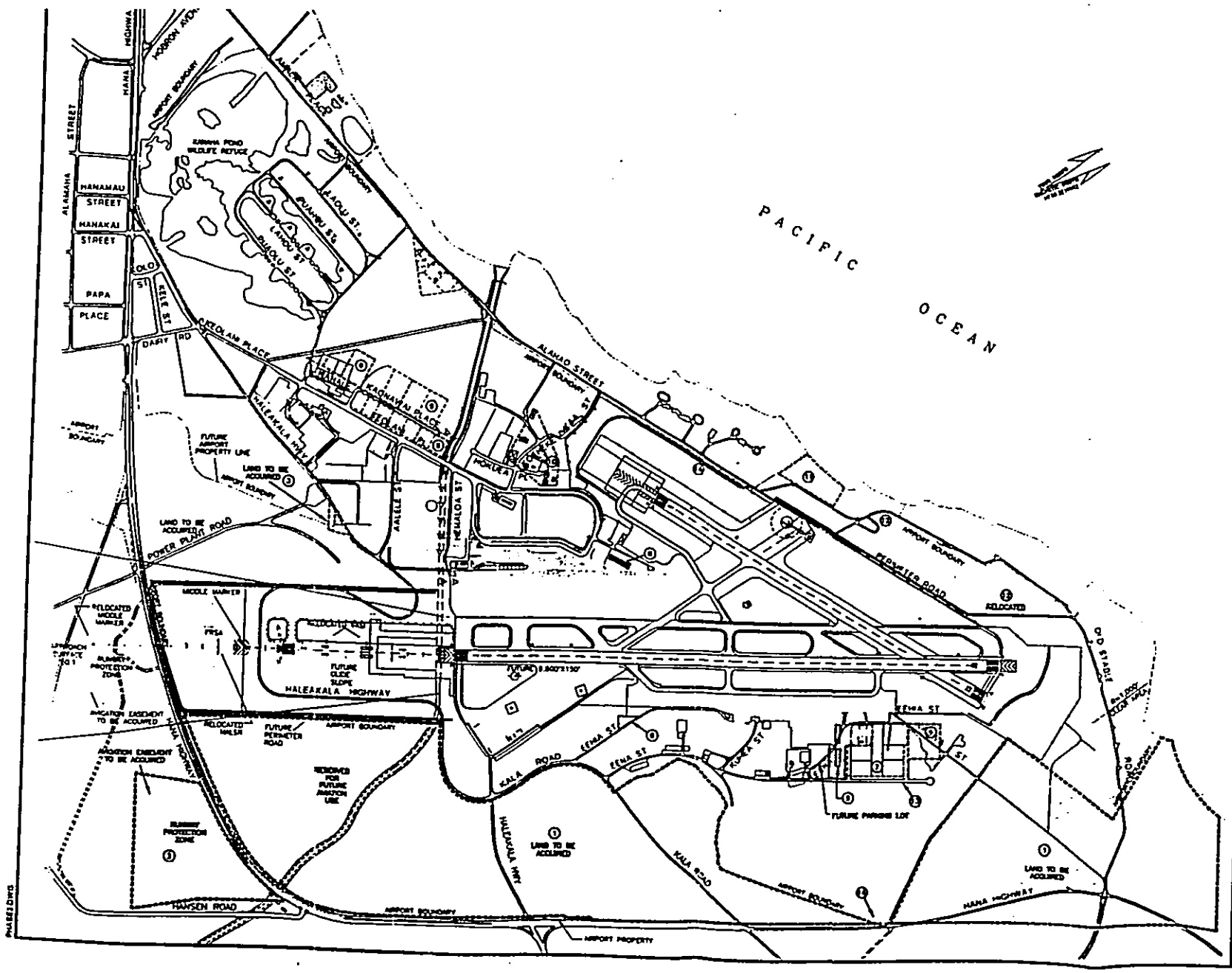
0 500 1000 1500 2000
GRAPHIC SCALE IN FEET

Edward K. Noda and Associates, Inc.

KAHULUI AIRPORT ENVIRONMENTAL IMPACT STATEMENT

PROPOSED PHASE 1 DEVELOPMENTS

DATE	FIGURE
MARCH, 1996	4



Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1. LAND FOR NEW PARALLEL RUNWAY AND RUNWAY PROTECTION ZONES AND RELOCATION OF HANA HIGHWAY
2. AVIATION EASEMENT FOR RUNWAY PROTECTION ZONE SOUTH OF HANA HIGHWAY
3. LAND FOR CARGO EXPANSION
4. CONSTRUCT NEW CARGO FACILITY ON EAST RAMP
5. ADDITIONAL T-HANGARS
6. NEW BOEING AIR TOUR FACILITIES
7. COMMERCIAL AVIATION LEASE LOTS AT EAST RAMP AREA
8. RELOCATE AIRLINE GROUND SUPPORT EQUIPMENT FACILITY
9. EXPAND GROUND TRANSPORTATION FACILITIES
10. RELOCATE GROUND TRANSPORTATION FACILITIES IN RUNWAY 6 RUNWAY PROTECTION ZONE
11. EXPAND KAHWA BEACH PARK
12. ROADWAY TO CONNECT ALAKAO STREET WITH OLD STABLE ROAD (EMERGENCY ONLY)
13. NORTH SECTION OF EAST RAMP ACCESS ROAD
14. EXTEND PERIMETER SERVICE ROAD AND FENCING AROUND NORTHWEST SIDE OF AIRPORT

0 500 1000 1500
GRAPHIC SCALE IN FEET

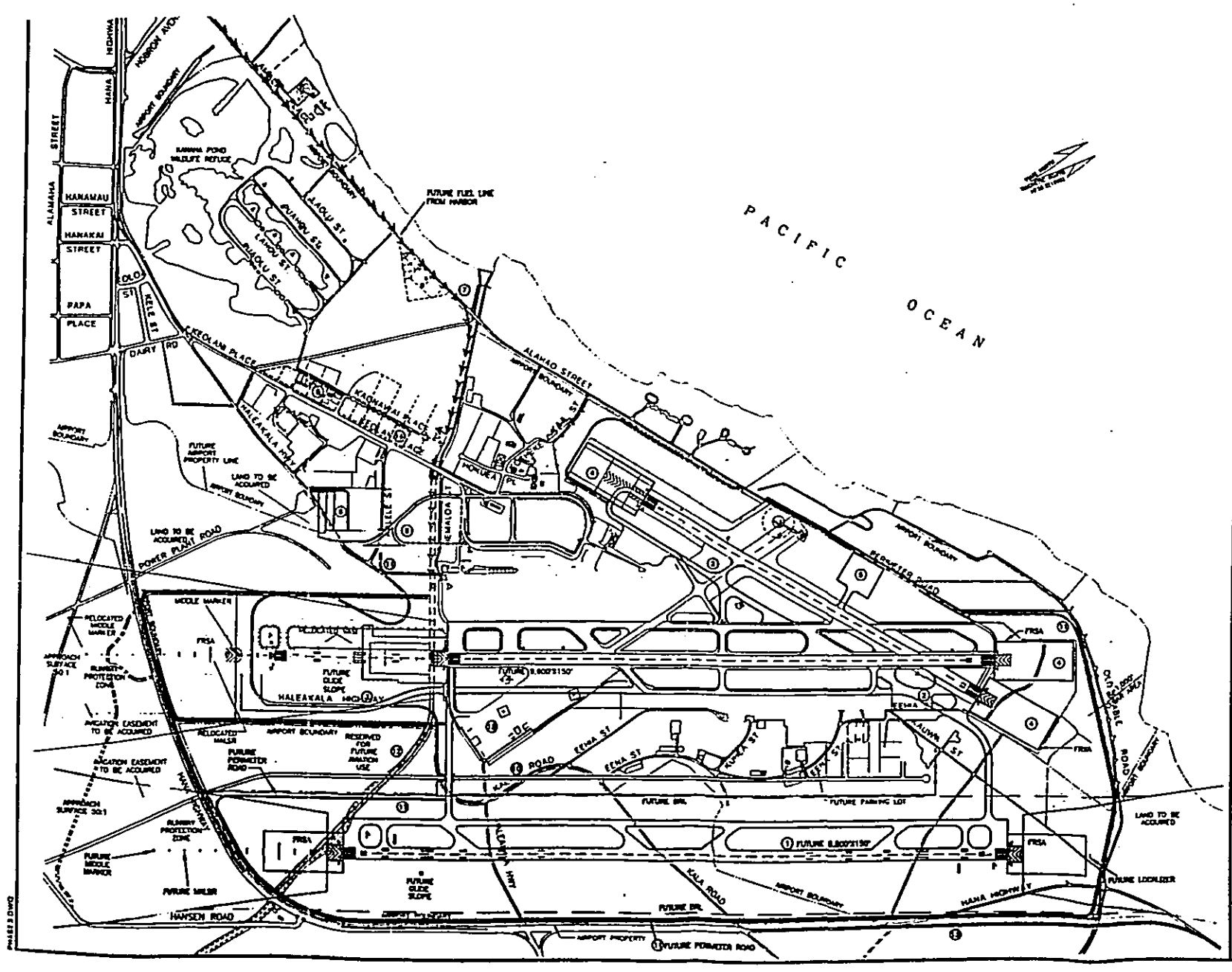
SOURCE:
KAHULUI AIRPORT MASTER PLAN

Edward K. Noda and Associates, Inc.

KAHULUI AIRPORT ENVIRONMENTAL IMPACT STATEMENT

PROPOSED PHASE 2 DEVELOPMENTS

DATE	FIGURE
FEBRUARY, 1997	5



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1. CONSTRUCT 8,000-FOOT PARALLEL RUNWAY 3R-21L AND TAXIWAYS AND INSTALL NAVAIDS
2. EXTEND PARALLEL TAXIWAY FOR RUNWAY 8-26
3. EXTEND EAST SIDE PARALLEL TAXIWAY FOR RUNWAY 3L-21R
4. WIDEN RUNWAY SAFETY AREAS FOR RUNWAYS 3L-21R AND 8-26
5. CONSTRUCT TRANSIENT AIRCRAFT PARKING APRON
6. CONSTRUCT ADDITIONAL AIR CARGO FACILITIES ON WEST SIDE
7. FUEL LINE FROM HARBOR
8. EXPAND NEW GROUND TRANSPORTATION FACILITIES
9. EXPAND PASSENGER TERMINAL PARKING LOT
10. CONSTRUCT EAST RAMP ACCESS ROAD FROM HANA HIGHWAY
11. CONSTRUCT PERIMETER/FENCE ROAD AND FENCING AROUND NEW RUNWAY 3R-21L
12. RE-CHANNEL KAHULUI GULCH FOR PARALLEL RUNWAY
13. REALIGN HANA HIGHWAY AT NORTHEAST END OF AIRPORT
14. PROVIDE LEASE LOT FOR FLIGHT KITCHEN
15. COMMERCIAL AVIATION LEASE LOTS

0 500 1000 1500
GRAPHIC SCALE IN FEET

SOURCE:
KAHULUI AIRPORT MASTER PLAN
& EIS MITIGATION MEASURES

Edward K. Noda and Associates, Inc.

KAHULUI AIRPORT ENVIRONMENTAL IMPACT STATEMENT

PROPOSED PHASE 3 DEVELOPMENTS

DATE	FIGURE
FEBRUARY, 1987	6

U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports District Office

300 Ala Moana Blvd., Rm. 7116
Honolulu, HI 96813
MAIL: Box 50244
Honolulu, HI 96850-0001
Telephone: (808) 541-1232
FAX: (808) 541-3462

September 22, 1997

Mr. Don Hibbard, Deputy
State Historic Preservation Officer
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

This confirms the telephone conversation of September 19, 1997, with David Welhouse of our office regarding the final version of the Programmatic Agreement (PA) for Kahului Airport, during which you provided your verbal concurrence with this final version of the PA so that we may begin the signature process.

If you have any questions, please call David Welhouse at (808) 541-1243.

Sincerely,

Howard S. Yoshioka

Howard S. Yoshioka
Manager, Airports District Office

cc: Jerry M. Matsuda, HDOT
Edward K. Noda & Associates

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: INFORMATION: Final Version of the Programmatic Agreement (PA); Kahului Airport, Kahului, Maui, Hawaii

Date: September 18, 1997

From: Supervisor, Planning Section, AWP-611

Reply to Attn. of: C.B. Lieber::
(310) 725-3614
FAX:(310) 536-8602

To: Manager, Airports District Office, HNL-600

As requested by your memo of September 12, 1997, we have reviewed the final version of the Programmatic Agreement (PA) for Kahului Airport, Kahului, Maui, Hawaii. The final PA contains all the necessary changes and modifications we identified in our memo to you on September 12, 1997.

Please ensure that the Figures attached to the final version do not have the copied binding marks appearing in the margins. This detracts from the overall quality and professional appearance of the document.

Mickeal R. Agalbi

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

SEP 18 1997

Mr. Howard S. Yoshioka
Manager, Airports District Office
Western-Pacific Region
Federal Aviation Administration
300 Ala Moana Boulevard, Room 7116
Honolulu, HI 96850-0001

REF: Kahului Airport Improvements
Kahului, Hawaii

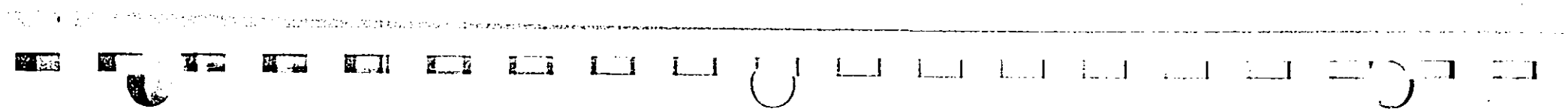
Dear Mr. Yoshioka:

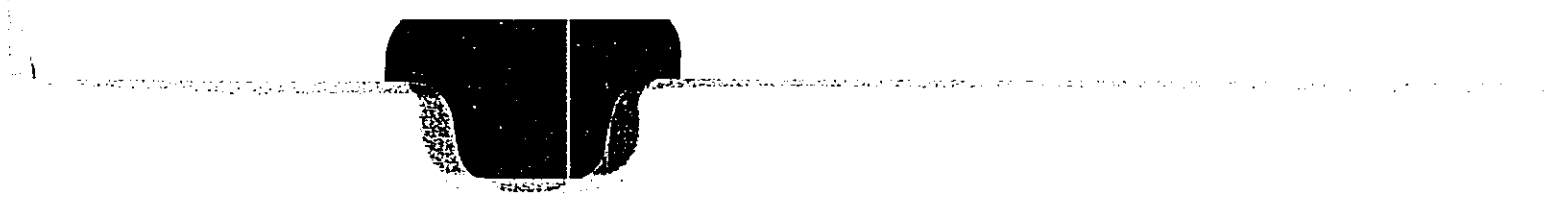
We have reviewed the September 12, 1997, draft of the Programmatic Agreement for the referenced project and are satisfied with its terms. We are prepared to sign the document when it is forwarded in final form.

We would like to take this opportunity to acknowledge the cooperative efforts of David Welhouse of your staff in consulting with us to revise the original draft. Resulting improvements to the document's clarity and consistency should be helpful to FAA and the Hawaii Department of Transportation in implementing its terms over the coming decades.

Sincerely,

L. Klima
Director
Office of Planning and Review





APPENDIX U

BIOLOGICAL ASSESSMENT & OTHER ALIEN SPECIES REFERENCES

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Biological Assessment and Other Alien Species Reports

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FINAL

ALIEN SPECIES BIOLOGICAL ASSESSMENT

FOR

KAHULUI AIRPORT IMPROVEMENTS KAHULUI, MAUI, HAWAII

Prepared For:

U.S. Department of Transportation
Federal Aviation Administration
Airports Division

And

State of Hawaii
Department of Transportation
Airports Division

Prepared By:

Edward K. Noda and Associates, Inc.
615 Piikoi Street, Suite 300
Honolulu, Hawaii 96814

March 10, 1997

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
As lead Federal Agency pursuant to the National Environmental Policy Act of 1969

STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION
As lead State Agency pursuant to the Hawaii Revised Statutes, Chapter 343

FINAL
KAHULUI AIRPORT ALIEN SPECIES
BIOLOGICAL ASSESSMENT
SUMMARY SHEET

This Biological Assessment (BA) has been prepared consistent with the requirements and procedures provided in 50 Code of Federal Regulations (CFR) Part 402 and has been prepared in compliance with the procedures required by other relevant statutes including, but not limited to, the National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA). The potential effects of the Proposed Project on listed and candidate plant and animal species and designated and proposed critical habitats are evaluated. Determinations whether any such species or habitat are likely to be adversely affected by the Proposed Project are made per 50 CFR Part 402.12 (a).

The information and analysis provided in this assessment are the result of an informal consultation and conference process that was initiated by the Federal Aviation Administration (FAA) with the U.S. Fish and Wildlife Service (FWS) over a two-year period (1994-1996). The State of Hawaii, Department of Transportation, Airports Division (HDOTA) has also been actively involved in this process. In addition, other interested parties have been involved in this process to the greatest extent practicable through the Environmental Impact Statement Scoping Process and Meetings, the Public Hearing and consultation. Further, to assist and to provide guidance in the preparation of this BA, the FAA formed and convened a Biological Assessment Technical (BAT) Panel of recognized alien species specialists, consisting of Federal and State agencies, Maui County, and private organization representatives. The BAT Panel did review and comment on portions of the draft BA; however, the conclusions and recommendations of the BA are those of the FAA and HDOTA.

As a result of the analysis performed for this Biological Assessment, it is the conclusion of the FAA and HDOTA that alien species introductions resulting from existing air and ship transportation will continue to have an impact on the Listed and Candidate Species, as designated under the U.S. Endangered Species Act on Maui.

The mitigation measures proposed in connection with this BA are intended to supplement the measures set forth in the Draft EIS (U.S. Department of Transportation 1996). In addition, these measures do not change the conclusion of the Draft EIS with respect to the impact of the Proposed Project on the introduction rate of alien species into Maui or the State of Hawaii. HDOTA will assist the Federal and State agencies by implementing the mitigation measures listed in Section 9.

Because no one can predict which alien species might be introduced into Maui and/or Hawaii due to the Proposed Project, or what the impacts of those alien species may have on listed or candidate species or critical habitats, the FAA and HDOTA have determined that generalized mitigation measures, to eliminate or minimize potential adverse effects of alien species introductions and impacts, would be the most effective measures to take. The proposed mitigation measures will reduce the increased risk of alien species due to the Proposed Project to the maximum extent possible, and mitigate the present rate of alien species arriving on domestic flights. These mitigation measures will be part of the Proposed Project and related to the processing of passengers at Kahului Airport. Other complimentary mitigation measures (see Section 8) have been determined to be infeasible and outside the control and function of the FAA and HDOTA. These mitigation measures, along with the United States Department of Agriculture (USDA) inspection procedures, will also mitigate alien species introduction from future international flights.

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Appendicies

Acronym Legend:

ADC:	U.S. Department of Agriculture, Animal Damage Control
APHIS:	U.S. Department of Agriculture, Animal and Plant Health Inspection Service
CGAPS:	Coordinating Group on Alien Species
CFR:	Code of Federal Regulations
FAA:	Federal Aviation Administration
FWS:	U.S. Fish and Wildlife Service
DLNR:	Hawaii Department of Land and Natural Resources
HDOA:	Hawaii Department of Agriculture
HDOTA:	Hawaii Department of Transportation, Airports Division
KPWS:	Kanaha Pond Wildlife Sanctuary
NPS:	National Park Service
OTA:	U.S. Congress, Office of Technology Assessment
USDA:	U.S. Department of Agriculture

SECTION 1
INTRODUCTION

1.1 INTRODUCTION AND PURPOSE

The spread of non-indigenous species or "alien species"[1] has become a world-wide concern for biologists, agriculturalists and health officials. In July 1996 a UN Conference on Alien Species was convened to discuss the problem and offer potential solutions. In 1993 the U.S. Congress, Office of Technology Assessment (OTA 1993) published *Harmful Non-Indigenous Species in the United States*, which opens with the following statement:

> *"The movement of plants, animals, and microbes beyond their natural range is much like a game of biological roulette. Once in a new environment, an organism may simply die. Or it may take hold and reproduce, but with little noticeable effect on its surroundings. But sometimes a new species spreads unimpeded, with devastating ecological or economic results."*

In Hawaii, since the 1970s an average of 20 new species of alien invertebrates have become established every year, of which about three of these species turn out to be economic pests (CGAPS 1996). Over 8,000 species of alien plants have already been brought into Hawaii and purposeful and inadvertent introductions continue (Smith 1985). The State's agricultural industry estimates it is losing $300 million per year in revenue from potential markets that now refuse Hawaii exports because of alien fruit flies that infest many crops (CGAPS 1996). Perhaps of more concern is the potential adverse impact of alien species on listed and candidate species of plants and animals and their habitat. Other than natural dispersion, alien species can only arrive on Maui or in Hawaii by aircraft and surface ships. The Hawaii Department of Agriculture (HDOA) has recorded introduced insect alien species for the 1990 to 1994 period and their hosts (Appendix A).

Potential increased alien species introduction concerns have been raised by the National Park Service (NPS), U.S. Fish and Wildlife Service, and others, regarding the proposed improvements (Proposed Project[2]) at Kahului Airport on Maui. Therefore, the Federal Aviation Administration and State Department of Transportation, Airports Division have undertaken this Biological Assessment (BA) to assess the potential impacts of an incremental increase in alien species introductions, due to the Proposed Project, on listed or candidate plant and animal species and designated or proposed critical habitats.

[1] The term "alien species", as used in this BA, refers to species that arrive in Hawaii with the help of humans, whether through intentional or accidental means.

[2] The Proposed Project, as described in Section 2 of this BA, includes over thirty (30) separate projects that would be constructed over the next several years (present to 2016). The proposed Runway 2-20 extension from 7,000 feet to 9,600 feet is the primary project that has given rise to the concern regarding alien species introductions into Kahului Airport. Therefore, the term "Proposed Project" used in this BA refers specifically to the runway extension project unless otherwise noted.

In addition, this BA confirms the information in the Kahului Airport Improvements Draft Environmental Impact Statement (U.S. Department of Transportation March 1996).

This BA is consistent with the requirements and procedures provided in 50 Code of Federal Regulations (CFR) Part 402 and has been prepared in compliance with the procedures required by other relevant statutes including, but not limited to, the National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA). The potential effects of the Proposed Project on listed and candidate plant and animal species and designated and proposed critical habitats are evaluated. Determinations whether any such species or habitat are likely to be adversely affected by the Proposed Project are made per 50 CFR 402.12 (a).

For reasons described later in this BA, this document is broader and more detailed than required by law. That is, this BA includes information regarding species that are not listed or candidates and non-critical habitats. This does not mean, however, that FAA and HDOTA believe they are required to mitigate any and all effects discussed in this BA. Rather, this should be used as a base information document for further analysis of an existing alien species situation in the Hawaiian Islands.

Pursuant to 50 CFR 402, a BA must only identify reasonable and prudent alternatives to the Proposed Project and reasonable and prudent measures to the extent impacts are identified that may jeopardize the continued existence of listed and candidate species or result in the destruction or adverse modification of critical habitat.

The information and analysis provided in this assessment are the result of an informal consultation and conference process that was initiated by the FAA with the FWS over a two-year period (1994-1996). HDOTA has also been actively involved in this process. In addition, other interested parties have been involved in this process to the greatest extent practicable through the Environmental Impact Statement Scoping Process and Meetings, the Public Hearing and consultation.

Further, to assist and to provide guidance in the preparation of this BA, the FAA formed and convened a Biological Assessment Technical (BAT) Panel of recognized alien species specialists, consisting of Federal and State agencies, Maui County and private organization representatives (see Appendix B). The BAT Panel did review and comment on portions of the draft BA; however, the conclusions and recommendations of the BA are those of the FAA and HDOTA.

1.2 KAHULUI AIRPORT AVIATION DEMAND FORECASTS

To the extent that alien species are introduced into Hawaii and/or Maui via aircraft and/or airline passengers, the potential incremental rate of increase of alien species introductions into Kahului Airport is partially dependent upon the incremental rate of increase of aviation activity and the flight origins of the aircraft at the airport. The forecasts of aviation demand (Table 1-1) project the change in levels of future aircraft operations and passengers at Kahului Airport.

Table 1-1, "Origins of Annual Flights for Kahului Airport", provides comparisons of aviation demand between the extension of Runway 2-20 (Proposed Project) versus the No Action Alternative. The forecasts also project the difference in interisland and overseas operations with and without the runway extension. The forecast also allows for a reasonable determination of origins of overseas aircraft arriving at Kahului Airport.

In 1996, U.S. mainland flights arriving at Kahului Airport consisted of non-stop (direct), one-stop, and two-stop flights. The origin of these flights were:

- Non-Stop Flights:
  - Los Angeles-Kahului
  - San Francisco-Kahului
  - Phoenix-Kahului
  - Vancouver, B.C.-Kahului
- One-Stop Flights:
  - Atlanta-Los Angeles-Kahului
  - Seattle-Los Angeles-Kahului
  - Boston-San Francisco-Kahului
  - Chicago (Midway)-Phoenix-Kahului
  - Indianapolis-Phoenix-Kahului
  - Dallas-Fort Worth-Honolulu-Kahului
- Two-Stop flights:
  - Houston-Dallas-Fort Worth-Honolulu-Kahului
  - Salt Lake City-Los Angeles-Honolulu-Kahului
  - Miami-Los Angeles-Honolulu-Kahului

As indicated in Table 1-1, in the year 2000, with the No Action alternative, a total of 35,500 flights are forecast to arrive at Kahului. This includes 3,900 domestic flights or aircraft from the mainland U.S., of which 2,700 will stop in Honolulu before arriving at Kahului and 1,250 being direct flights from West Coast cities, *i.e.*, Los Angeles, San Francisco and Seattle. In year 2000, with the Proposed Project, *i.e.*, runway extension, a total of 4,700 domestic flights at Kahului are forecast, with approximately 50 percent stopping in Honolulu first and the other 50 percent being direct flights from the above listed cities plus possibly Boston via Chicago.

TABLE 1-1
ORIGINS OF ANNUAL OVERSEAS FLIGHTS FOR KAHULUI AIRPORT

Date: March 5, 1997

Origin and Aircraft Type	2000 No Action		2000 Extension		2010 No Action		2010 Extension	
	Cities	Flights	Cities	Flights	Cities	Flights	Cities	Flights
Interisland/Stop Mainland								
Medium 2-Engine	LAX-HNL-OGG	250	LAX-HNL-OGG	250	SFO-HNL-OGG	350	SFO-HNL-OGG	350
					LAX-HNL-OGG	350	LAX-HNL-OGG	350
Large 2-Engine	SFO-HNL-OGG	100	SFO-HNL-OGG	100	SFO-HNL-OGG	300	SFO-HNL-OGG	20
					LAX-HNL-OGG	300	LAX-HNL-OGG	20
Large 3-Engine	SFO-HNL-OGG	700	SFO-HNL-OGG	400	SFO-HNL-OGG	350	SFO-HNL-OGG	300
	LAX-HNL-OGG	950	LAX-HNL-OFF	950	LAX-HNL-OFF	750	LAX-HNL-OGG	700
	DFW-HNL-OGG	350	DFW-HNL-OGG	300	DFW-HNL-OFF	350	DFW-HNL-OGG	300
	ORD-HNL-OGG	350			ORD-HNL-OGG	350		
SUBTOTAL		2,700		2,000		3,100		2,040
Domestic-West Coast								
Medium 2-Engine	SEA-SFO-OGG	200	SEA-SFO-OGG	200	SEA-SFO-OGG	300	SEA-SFO-OGG	300
					ATL-LAX-OGG	350	ATL-LAX-OGG	300
Large 2-Engine			LAX-OGG	100			DEN-LAX-OGG	20
							LAX-OGG	20
Large 3-Engine	SFO-OGG	300	SFO-OGG	650	SFO-OGG	300	SFO-OGG	650
	LAX-OGG	700	LAX-OGG	1,000	LAX-OGG	650	LAX-OGG	650
SUBTOTAL		1,200		1,950		1,600		1,940
Domestic-Dallas/Ft. Worth								
Large 3-Engine				200			ATL-DFW-OGG	350
SUBTOTAL		0		200		0		350
Domestic-Chicago								
Large 2-Engine							DTW-ORD-OGG	170
Large 3-Engine			BOS-ORD-OGG	550			BOS-ORD-OGG	600
SUBTOTAL		0		550		0		770
TOTAL DOMESTIC		3,900		4,700		4,700		5,100
International-Vancouver								
Medium 2-Engine	YVR-OGG	50	YVR-OGG	50	YVR-OGG	50	YVR-OGG	100
SUBTOTAL		50		50		50		100
International-Japan								
Large 4-Engine							NRT-OGG	1,100
SUBTOTAL		0		0		0		1,100
TOTAL INTERNATIONAL		50		50		50		1,200
TOTAL OVERSEAS		3,950		4,750		4,750		6,300
TOTAL INTERISLAND		31,550		28,700		40,100		34,050
TOTAL AIRCRAFT FLIGHTS		35,500		33,450		44,850		40,350

AIRPORT/CITY CODES: LAX Los Angeles, HNL Honolulu, OGG Kahului, SFO San Francisco, DFW Dallas-Ft. Worth, ORD Chicago, SEA Seattle, YVR Vancouver, BOS Boston, ATL Atlanta, DEN Denver, DTW Detroit, NRT Tokyo, OSA Osaka

Source: Kahului Airport Draft Environmental Impact Statement
Note: Total may differ from flight numbers due to rounding.

However, in the year 2000, with the Proposed Project, there will be a decrease in the total flights arriving at Kahului Airport because there will be a decrease in the number of interisland flights. Also, in the year 2000, direct international flights are forecast from Vancouver only, and as described below, these flights are pre-cleared, *i.e.* receive U.S. agricultural clearance in Vancouver.

Flight origins for the year 2010, with and without the Proposed Project, are similar to those for the year 2000. However, in the year 2010, with the Proposed Project, direct flights are forecast from Atlanta, Denver, Dallas-Fort Worth and Detroit.

The forecasts also indicate that in the year 2000, both with and without the Proposed Project, there will be a total of 50 international flights from Vancouver and in the year 2010, without the Proposed Project, there will continue to be 50 pre-cleared flights from Vancouver. Also, in the year 2010, with the Proposed Project, a total of 1,200 international flights are forecast, with 1,100 being from Japan (Narita) and 100 from Vancouver. While the Japan flights originate at Narita, it is likely there will be connecting passengers from other Asian or Far East cities on those flights.

Forecast Kahului Airport passenger levels are shown in Table 1-2. As indicated, a total of 7,988,000 are forecast in the year 2010 with the Proposed Project. Also, as shown in Table 1-2, the 2010 passenger levels with the Proposed Project are forecast to be only three percent greater than 2010 passenger levels without the Proposed Project [see Appendix E, Kahului Airport Improvements, Draft EIS (US Department of Transportation March 1996), for derivation of three percent difference].

TABLE 1-2
KAHULUI AIRPORT PASSENGER FORECAST
(Enplaned and Deplaned Passengers)

Origin of Passengers	YEAR/ACTION						
	1992	No Action 2000	Proposed Project 2000	No Action 2005	Proposed Project 2005	No Action 2010	Proposed Project 2010
Mainland U.S.	1,281,510	1,511,650	1,557,000	1,743,700	1,796,000	1,981,550	2,041,000
International	0	0	0	0	0	0	511,000
Interisland	3,900,713	4,605,825	4,744,000	5,183,350	5,344,000	5,773,790	5,436,000
TOTALS	5,182,510	6,117,475	6,311,000	6,932,050	7,140,000	7,753,440	7,988,000

The levels of aircraft operations and passengers forecast for Kahului Airport are primarily dependent upon factors unrelated to the Proposed Project. For example, an airline's decision to expand overseas, domestic or international service at Kahului is based

upon factors such as market demand and, in the case of international service, the ability to negotiate a bilateral agreement - factors largely unrelated to the Proposed Project.

The Proposed Project will not, in itself, have a large direct impact on the amount of passengers forecasted to use the airport in the year 2010 (three percent). That is, the Proposed Project is in response to existing and forecast aviation demands that will occur regardless of the Proposed Project because there is nothing technically curtailing overseas flights from the mainland U.S. or foreign airports from landing at the present airport.

However, the Proposed Project may accommodate or make more viable future non-stop domestic service to and from North America and international service to and from some destinations beyond North America and/or to/from Asia. This assumes the market for such service exists and federal approval to fly such routes is obtained. This type of air carrier service to/from Kahului may ultimately change one of the alien species introduction pathways at the airport, and may result in an increase in the risk of alien species introductions in the airport environs may result.

In light of this potential indirect impact, and as requested by the FWS, this assessment investigates the potential effect on the introduction rate of alien species as a result of direct international flights, primarily those from Pacific Rim countries, and direct flights from overseas United States destinations to Kahului[3].

1.3 BACKGROUND ON ALIEN SPECIES IN HAWAII

Over 2,500 alien arthropod species and about 75+ alien non-marine mollusks are established in the wild in Hawaii (Table 1-3). Howarth (1985a) has indicated that while data are too meager to fully assess the impacts any of these organisms have on the native biota, there are several areas of concern, as described in this BA.

Alien species were first introduced into Hawaii over 1,500 or more years ago with the arrival of sea-faring Polynesians. These initial settlers of the islands intentionally introduced about 30 kinds of plants for cultivation, including sugar cane (*Saccharum officinarum*) and coconut (*Cocos nucifera*), and accidentally brought along several weeds. They also brought a few domesticated animals (pigs, dogs, and chickens) and stowaways like rats, lizards, and probably several insects. Therefore, the rate of alien species becoming established in the islands changed from the natural rate of one new species every 50,000 years to three or four new species every 100 years (OTA 1993).

A new wave of alien species introductions began with the arrival of Europeans in 1778, when the rate of successful introductions of alien species increased by hundreds of thousands of times the natural rate. Among the most significant and persistent

[3] Note: while this BA is generally concerned with the incremental rate of increase of alien species within the airport environs as a result of the Proposed Project, much of the information contained herein is directed at the entire island of Maui and describes a "worst case" scenario regrading the possible purposeful and inadvertent introductions of alien plant and animal species into Maui specifically, and the State in general.

introductions were goats (*Capra hircus*), sheep (*Ovis aries*), European pigs (*Sus scrofa*), and cattle (*Bos taurus*), released by explorer James Cook and other early ship captains as gifts or to create herds to feed their crews (OTA 1993). Feral European pigs and goats, in particular, remain serious pests of natural arens, and to some extent, agricultural areas.

In the subsequent two centuries of European and Asian settlement, horses, deer, and more rodents have been introduced. More non-indigenous bird species, including 15 species of game birds, have become established in Hawaii than anywhere else (OTA 1993). More than 4,600 alien plant species have been introduced, primarily for cultivation. Of these, almost 900 have become established, so that today Hawaii's wild, non-indigenous plant species are approaching the number of indigenous species (OTA 1993).

TABLE 1-3
ESTIMATES OF NUMBERS OF SPECIES OF THE HAWAIIAN BIOTA

TAXON	TOTAL	ENDEMIC[a]	NIS[b]
Algae and other protists	2,228	4	5?
Fungi and lichens	2,023	240	0?
Flowering plants	1,910	850	877
Other plants	703	243	50
Mollusks	1,656	956	75+
Insects	7,862	5,237	2,527
Other arthropods	1,795	335	519
Other invertebrates	2,338	785	250
Fish	1,195	139	73
Amphibians	4	0	4
Reptiles	24	0	20
Birds	274	60	46
Mammals	44	1	19
TOTAL	22,056	8,850	4,465+

[a] Endemic = Native to Hawaii
[b] NIS = Non-indigenous Species = alien species

Source: Miller, S.E. and L.G. Eldredge. 1996. Numbers of Hawaiian Species: Supplement. Bishop Museum Occasional Papers. Bishop Museum Press, Honolulu. pp 8-17.

Compounding the first introductions of alien species, and their ability to become established in Hawaii, was the early Hawaiian's practice of burning and clearing native vegetation for agriculture, especially the inland areas up to about the 1,500-foot (457 meters) elevation (Cuddihy, L.W. and C.P. Stone 1990).

Alien species in Hawaii are not limited to terrestrial plants and mammals. Alien freshwater fish, most of which were introduced for sport, food, or other reasons, far outnumber the relatively few indigenous freshwater species. In the case of insects, alien species have been estimated to constitute up to 25 percent of the insects in Hawaii (see Table 1-4) and according to the State Department of Agriculture, about one-quarter of Hawaii's alien insect pest species are mainland species (OTA 1993).

TABLE 1-4
PAST AND PRESENT STATUS OF NON-MARINE SPECIES IN HAWAII

Group	Original Immigrants (Number)	Indigenous Species (Number)	Endemic Species (No./%)	Extinct Species (No./%)	Threatened/ Endangered (No./%)	Established Alien Species (No./%)
Plants	407	≈1,400	≈1,200/85	/≈10	/≈30	≈900/45
Birds	21	≈100	92/≈92	60/≈60	30/≈70	38/≈48
Mammals	1	1	0	0	1/100	19/95
Reptiles	0	NA	NA	NA	NA	13/100
Amphibians	0	NA	NA	NA	NA	4/100
Freshwater Fish		5	5/100	0	0	29/84
Mollusks	22-24	≈1,060	/≈99	/≈50	/100	≈30/6
Insects	350-400	≈8,000	/≈98	--	/≈30	≈2,500/≈25

Source: U.S. Congress, Office of Technology Assessment, *Harmful Non-Indigenous Species in the United States*, OTA-F-565 (Washington DC: U.S. Government Printing Office, September 1993).

Just as goats and pigs were intentionally introduced, many other pest species were deliberate, well-intentioned introductions into Hawaii. Several plants originally brought in for agricultural or ornamental purposes, such as strawberry guava (*Psidium cattleianum*), banana poka (*Passiflora mollissima*), and fountain grass (*Pennisetum setaceum*) have become invasive. Some animals brought in to control other pests, such as the Indian mongoose (*Herpestes auropunctatus*), have become pests themselves. The mongoose preys on Nene (Hawaiian goose) (*Branta sandvicensis*), and at least seven other endangered species (OTA 1993). The rosy snail (*Euglandina rosea*) from Florida, was introduced in 1955 to prey on the pestiferous non-indigenous African giant snail (*Achatina fulica*) and is now thought to have also hunted many of the endemic snails to extinction (OTA 1993). Over one-third of the alien invertebrates in Hawaii were intentionally introduced, mostly for potential control of pest species, but also for pollination, food, and other natural products (Howarth 1985a).

Not all of Hawaii's indigenous species have been lost in recent times. Polynesians and their animals probably hunted some birds to extinction, or ensured their demise by clearing their habitat. At least 15 species and an additional 9 subspecies of birds are

extinct since Captain Cook landed in Hawaii. Most of the remaining birds are either threatened or endangered. At least a tenth of Hawaii's plant species are already extinct, and about 30 percent of the remaining species are considered threatened or endangered, with some botanists say as many as one-half may be at risk (Howarth 1985a). The information regarding indigenous insects and other life forms are too poorly known to allow an assessment of their status. At least one-half of Hawaii's land snails are thought to be extinct, while the remaining species are probably threatened or endangered, in large part because of the imported rosy snail. Additional information regarding the impacts of alien species on listed and candidate species of plants and animals is provided in Section 6 of this BA.

Present pathways for the inadvertent introduction of alien species in Hawaii are not well understood. However, according to an opinion survey of State agriculture inspectors, airline passengers are thought to be the most common pathway for insect pests and illegal animals to be introduced, while undeclared plants are hidden in carry-on or checked baggage. Table 1-5 is based on interviews with Hawaii Department of Agriculture (HDOA) inspectors and indicates the *perceived* pathways and percentages of insects and illegal animals entering Hawaii through those pathways.

While there is no scientifically derived direct evidence, nor are there controlled scientific studies to support the perceptions listed in Table 1-5, the relatively rapid increase in alien species in Hawaii over the past 20 to 30 years, coincident with increased air traffic, generally supports the perception that airline passengers are one of the causative agents.

TABLE 1-5
PERCEIVED IMPORTANCE OF PATHWAYS IN THE INTRODUCTION OF INSECT PESTS AND ILLEGAL ANIMALS IN HAWAII

Source	Percent of Total
Domestic Airline Passengers	27
First Class mail	23
Cargo[1]	18
Military[2]	13
Foreign Arrivals	13
Private Boats, Planes[3]	6

Notes: [1] Cargo is presumed to include air and surface cargo.
[2] Presumed to include air and surface vessels.
[3] Commercial vessels presumed to be included under Cargo above.

Source: U.S. Congress, Office of Technology Assessment, *Harmful Non-Indigenous Species in the United States*, OTA-F-565 (Washington DC: U.S. Government Printing Office, September 1993).

During this same period there has been a similar increase in surface ship traffic landing cargo in Hawaii and it is likely shipping dunnage contains alien insects. That is, shipping crates, pallets and other packing materials may contain larvae, eggs or immature insects that are difficult to visually spot and detect by agricultural inspectors. While Federal agricultural inspectors (U.S. Department of Agriculture) can quarantine certain types of packing material from different foreign ports, State agriculture inspectors may not quarantine shipments from U.S. mainland ports, even though that material may have originated in a foreign port.

1.4 CONTENTS OF THIS BIOLOGICAL ASSESSMENT

The following sections of this BA describe the Proposed Project; the airport environs and indirect areas of Maui that may be affected by the potential increased rate of alien species introductions as a result of the Proposed Project; present (January 1997) FWS Maui's listed and candidate plant and animal species; the major taxonomic groups that have become invasive alien pests in Hawaii; the impacts of alien species on natural systems in Hawaii; agencies responsibilities and limitations regarding alien species; mitigation measures to minimize potential adverse effects of alien species on Maui; and recommendations regarding future actions.

SECTION 2
THE PROPOSED PROJECT

2.1 INTRODUCTION

The Kahului Airport Improvements Environmental Impact Statement (EIS) is for the Proposed Project recommended in the 1993 Kahului Airport Master Plan (Belt Collins & Associates and Aries Consultant, Ltd. June 1993). The Proposed Project is divided into three phases based upon the need to accommodate existing and forecast aviation demand at Kahului Airport.

The phasing of the Proposed Project is based on the need to accommodate existing and forecast demand with the actual design for future phases (2 and 3) to be initiated as actual aviation demand exceeds critical demand levels (typically 75 percent or greater than design capacity). Phasing the Proposed Project also allows funding to be available as necessary for each phase.

Phase 1 is scheduled from the present to the year 2002. Phase 2 is scheduled from 2003 to the year 2008, and Phase 3 from 2009 to the year 2016. Because Phases 1 and 2 are in the near future, they are covered in the EIS in detail (U.S. Department of Transportation March 1996). Phase 3 is in the far future, 2009 to 2016, and is only discussed to the extent reasonable and practical in the EIS. It is expected that Phase 3 projects will require additional environmental analysis and documentation prior to those projects being implemented.

The impacts for the following 1993 Master Plan were assessed in earlier environmental documentation. Therefore, because these projects are presently in progress or have been completed, their impacts will not be reanalyzed in the Kahului Airport Environmental Impact Statement.

- Aircraft Rescue and Fire Fighting (ARFF) Station. This facility has been constructed on the East Ramp. The Environmental Assessment for this project was completed in November 1991 and found that there would be no significant adverse impacts upon the environment.
- ARFF Training Facility. This facility is currently being designed and will be located north of Runway 5-23 on the existing training facility. The Environmental Assessment for this project was completed in August 1995 and found that there would be no significiant adverse environmental impacts.
- Acquisition of Land for the Airport Access Roadway. The acquisition of approximately 126 acres of land for the Airport Access Roadway has been

completed. The Environmental Assessment[1] for this project was completed in April 1989 and found no significant impacts for this project.

- Relocation of the VORTAC (Very high frequency omnirange station and a Tactical air navigation equipment). The construction of this facility was completed in 1995, but is currently not operational. The Environmental Assessment for this facility was completed in July 1993 and concluded that all impacts would be mitigated to a level of insignificance.

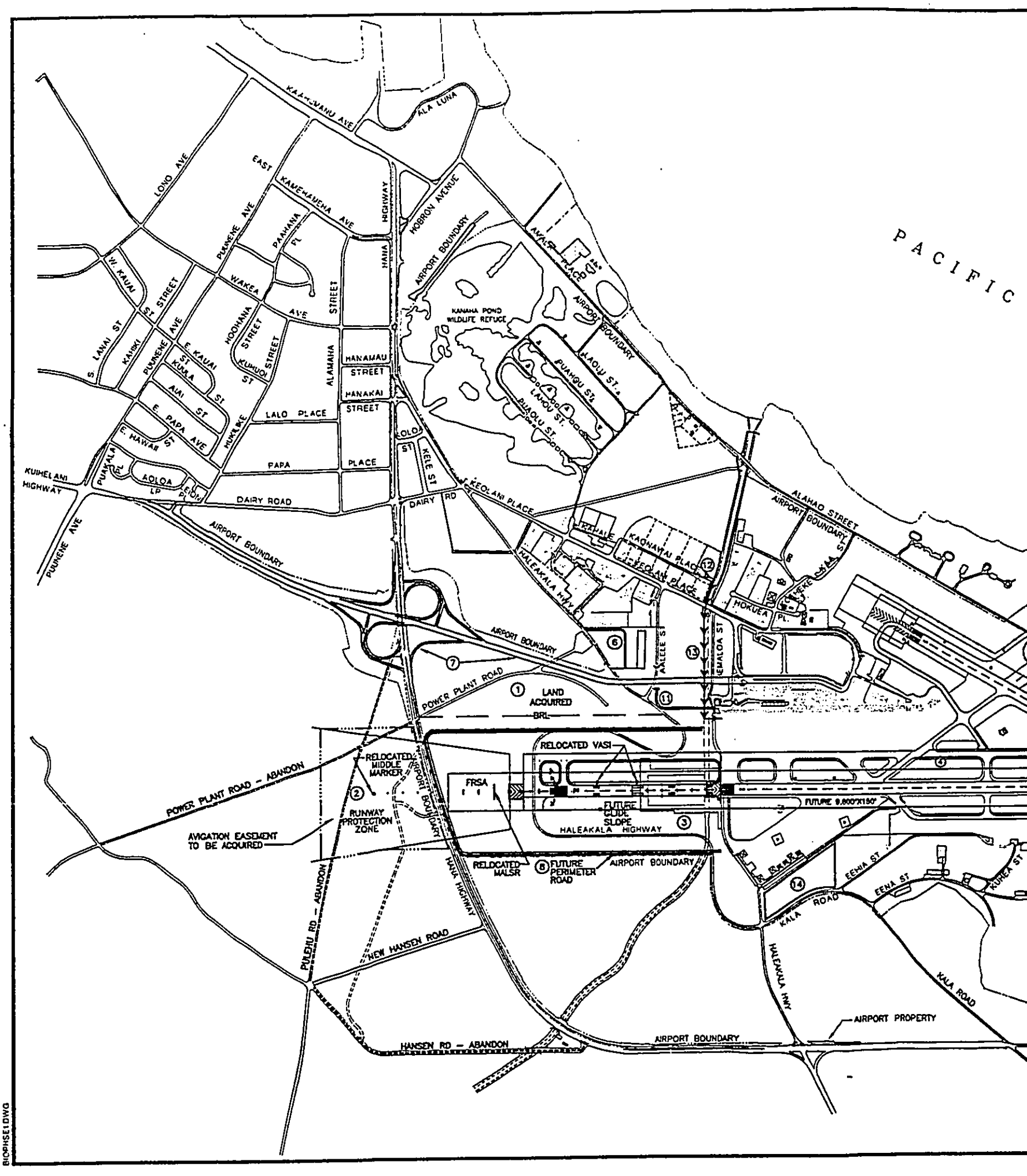
Phase 1, 2 and 3 projects are listed below and are shown on Figures 2-1, 2-2 and 2-3.

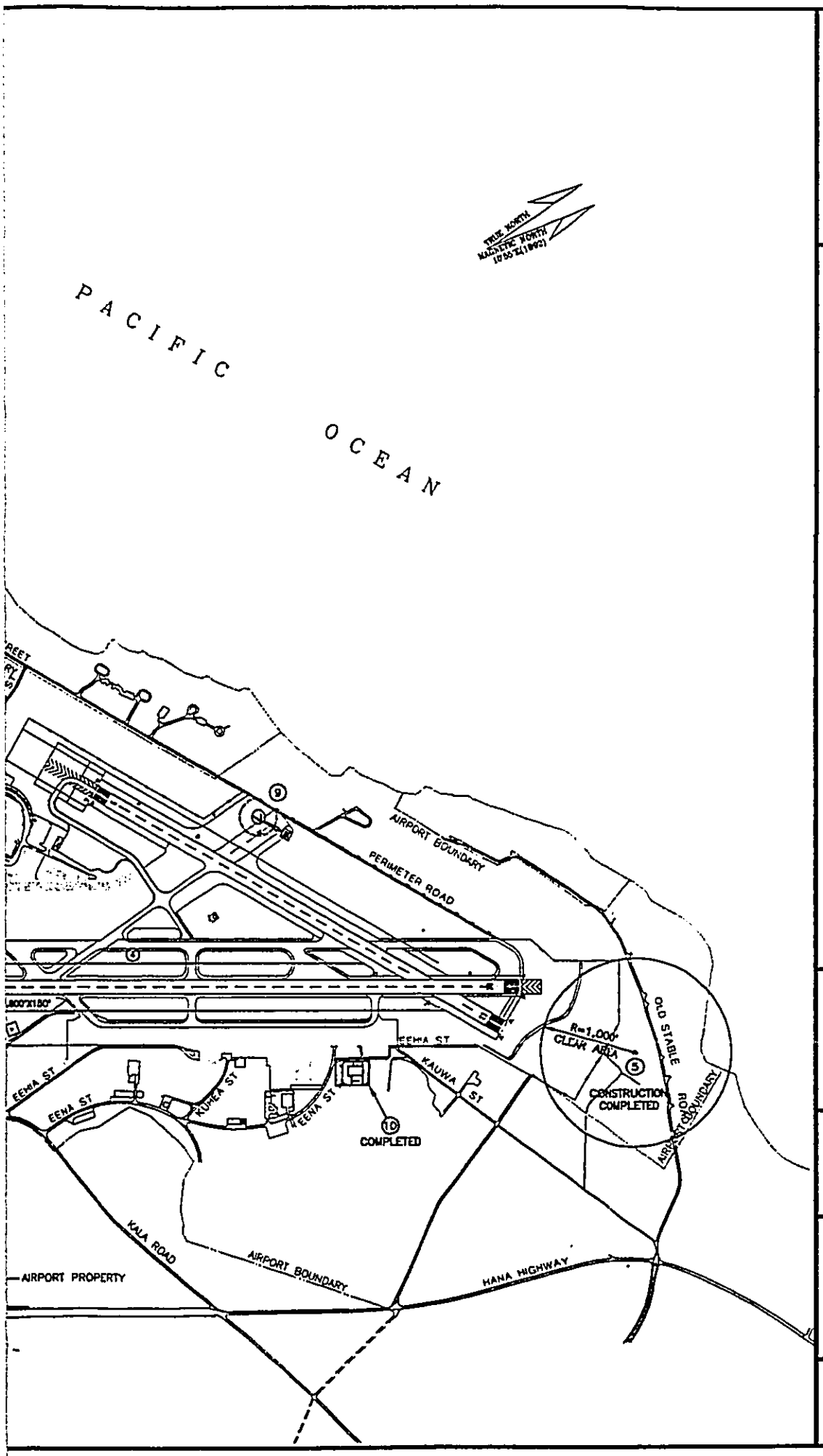
2.2 PHASE 1 - PRESENT TO YEAR 2002

The following projects are included in Phase 1:

- Land for the Airport Access Road and Interchange (completed).
- Avigation Easement for portion of Runway 2 Protection Zone South of Hana Highway.
- Extend Runway 2-20 to 9,600 feet with associated Taxiways and relocated Navaids.
- Repave and strengthen existing Runway 2-20.
- Relocate Vortac (construction completed).
- Construct West Side Cargo Facilities including Access Road.
- Airport Access Road and Interchange.
- Perimeter/Service Road and Fencing.
- ARFF Training Facility (under design).
- ARFF Facility (completed).
- Post Office Ramp Access Road.
- Bulk Fuel Storage Tanks.
- Underground Fuel Pipeline (Terminal Area Only).

[1] This Environmental Assessment did not address any land use changes. Therefore, the land use issues are being addressed in the joint EIS.


PACIFIC
KAAHUMANU AVE
ALA LUNA
LONO AVE
EAST KAUMUALII AVE
HIGHWAY
HOBRON AVENUE
AIRPORT BOUNDARY
AVIATOR PLACE
AIRPORT BOUNDARY
KANAHA POND WILDLIFE REFUGE
PUAHOU ST.
LAOLU ST.
LANOU ST.
PUAOLU ST.
PUKENE AVE
PAAHANA PL
HANA
W. KAUAI ST
STREET
WAKEA AVE
STREET
S. LANAI ST
KAIHKI
PUKENE AVE
E. KAUAI ST
KUNA ST
AIAI ST
E. PAPA AVE
E. HAWAII ST
HOOHANA STREET
KUMUOI ST
HUKILIKE
ALAMAHA
HANAMAU STREET
HANAKAI STREET
LALO PLACE
PAPA PLACE
LOLOA ST
KELE ST
KEOLANI PLACE
ALAHAO STREET
AIRPORT BOUNDARY
KUIHELANI HIGHWAY
PUAKALA PL
AOLOA LP
DAIRY ROAD
DAIRY RD
AIRPORT BOUNDARY
PUKENE AVE
HALEAKALA HWY
KAONAWAI PLACE
KEOLANI PLACE
HOKUEA PL
AIRPORT BOUNDARY
AKELE ST
KEMALOA ST
POWER PLANT ROAD
LAND ACQUIRED
BRL
RELOCATED VASI
RELOCATED MIDDLE MARKER
AIRPORT BOUNDARY
FRSA
FUTURE 9,600'X150'
FUTURE GLIDE SLOPE
HALEAKALA HIGHWAY
POWER PLANT ROAD – ABANDON
RUNWAY PROTECTION ZONE
AVIGATION EASEMENT TO BE ACQUIRED
RELOCATED MALSR
FUTURE PERIMETER ROAD
AIRPORT BOUNDARY
HANA HIGHWAY
EEMA ST
EEMA ST
KUREA ST
KALA ROAD
PULEHU RD – ABANDON
NEW HANSEN ROAD
HALEAKALA HWY
KALA ROAD
AIRPORT PROPERTY
HANSEN RD – ABANDON
AIRPORT BOUNDARY
BIOPHSE1.DWG



Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1 LAND FOR THE AIRPORT ACCESS ROAD AND INTERCHANGE (COMPLETED)
2 AVIGATION EASEMENT FOR PORTION OF RUNWAY 2 PROTECTION ZONE SOUTH OF HANA HIGHWAY
3 EXTEND RUNWAY 2-20 TO 9,800 FEET WITH ASSOCIATED TAXIWAYS AND RELOCATE NAVAIDS
4 REPAVE AND STRENGTHEN EXISTING RUNWAY 2-20
5 RELOCATE VORTAC (CONSTRUCTION COMPLETED)
6 CONSTRUCT CARGO FACILITIES INCLUDING ACCESS ROAD
7 AIRPORT ACCESS ROAD AND INTERCHANGE
8 PERIMETER/SERVICE ROAD AND FENCING
9 ARFF TRAINING FACILITY (UNDER DESIGN)
10 ARFF FACILITY (COMPLETED)
11 POST OFFICE RAMP ACCESS ROAD
12 BULK FUEL STORAGE TANKS
13 UNDERGROUND FUEL PIPELINE
14 INTERIM HELICOPTER FACILITY

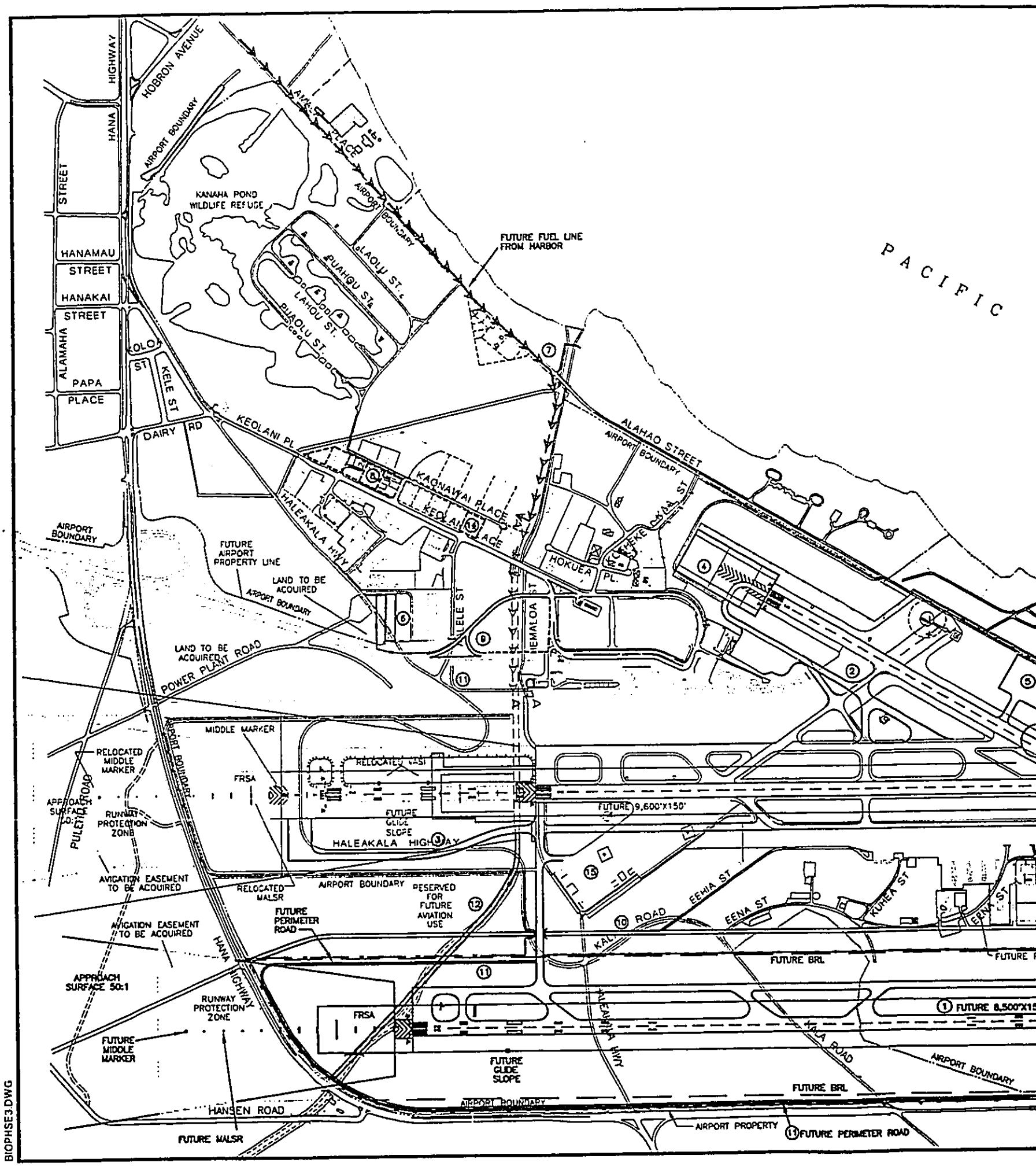
0 500 1000 1500 2000
GRAPHIC SCALE IN FEET

Edward K. Noda and Associates, Inc.

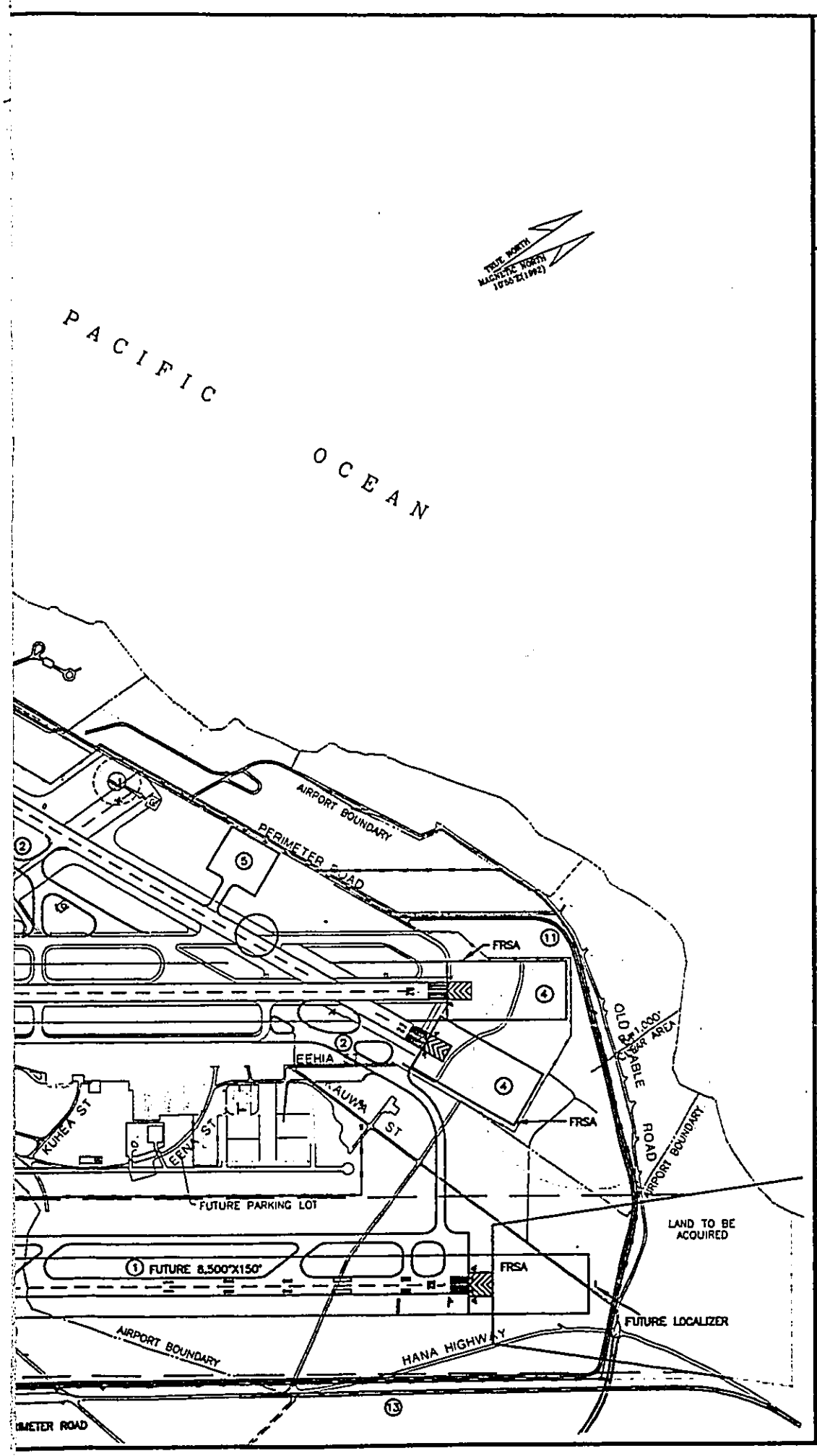
ALIEN SPECIES
BIOLOGICAL ASSESSMENT
FOR
KAHULUI AIRPORT
MASTER PLAN IMPROVEMENTS

PROPOSED
PHASE 1
DEVELOPMENTS

DATE	FIGURE
JANUARY, 1997	2-1



BIOPHSE3.DWG



Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1 CONSTRUCT 8,500-FOOT PARALLEL RUNWAY 2R-20L AND TAXIWAYS AND INSTALL NAVAIDS
2 EXTEND PARALLEL TAXIWAY FOR RUNWAY 6-23
3 EXTEND EAST SIDE PARALLEL TAXIWAY FOR RUNWAY 2L-20R
4 WIDEN RUNWAY SAFETY AREAS FOR RUNWAYS 2L-20R AND 6-23
5 CONSTRUCT TRANSIENT AIRCRAFT PARKING APRON *
6 CONSTRUCT ADDITIONAL AIR CARGO FACILITIES ON WEST SIDE
7 FUEL LINE FROM HARBOR
8 EXPAND NEW GROUND TRANSPORTATION FACILITIES
9 EXPAND PASSENGER TERMINAL PARKING LOT
10 CONSTRUCT EAST RAMP ACCESS ROAD FROM HANA HIGHWAY
11 CONSTRUCT PERIMETER/SERVICE ROAD AND FENCING AROUND NEW RUNWAY 2R-20L
12 RE-CHANNEL KALIALINUI GULCH FOR PARALLEL RUNWAY
13 REALIGN HANA HIGHWAY AT NORTHEAST END OF AIRPORT
14 PROVIDE LEASE LOT FOR FLIGHT KITCHEN
15 COMMERCIAL AVIATION LEASE LOTS

0 500 1000 1500
GRAPHIC SCALE IN FEET

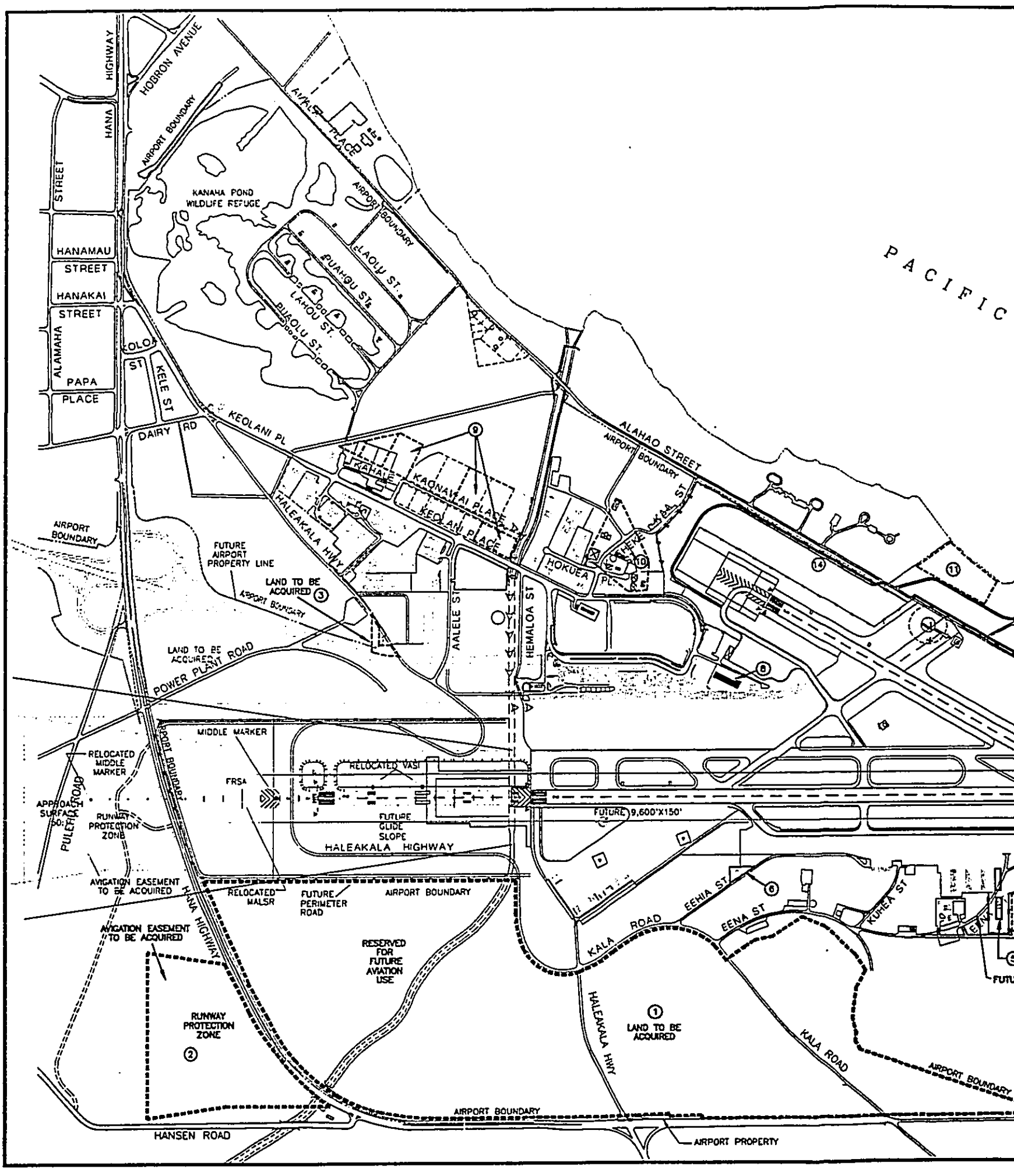
SOURCE:
KAHULUI AIRPORT MASTER PLAN
* (PER MITIGATION MEASURE)

Edward K. Noda and Associates, Inc.

ALIEN SPECIES BIOLOGICAL ASSESSMENT FOR KAHULUI AIRPORT MASTER PLAN IMPROVEMENTS

PROPOSED PHASE 3 DEVELOPMENTS

DATE	FIGURE
JANUARY, 1997	2-3



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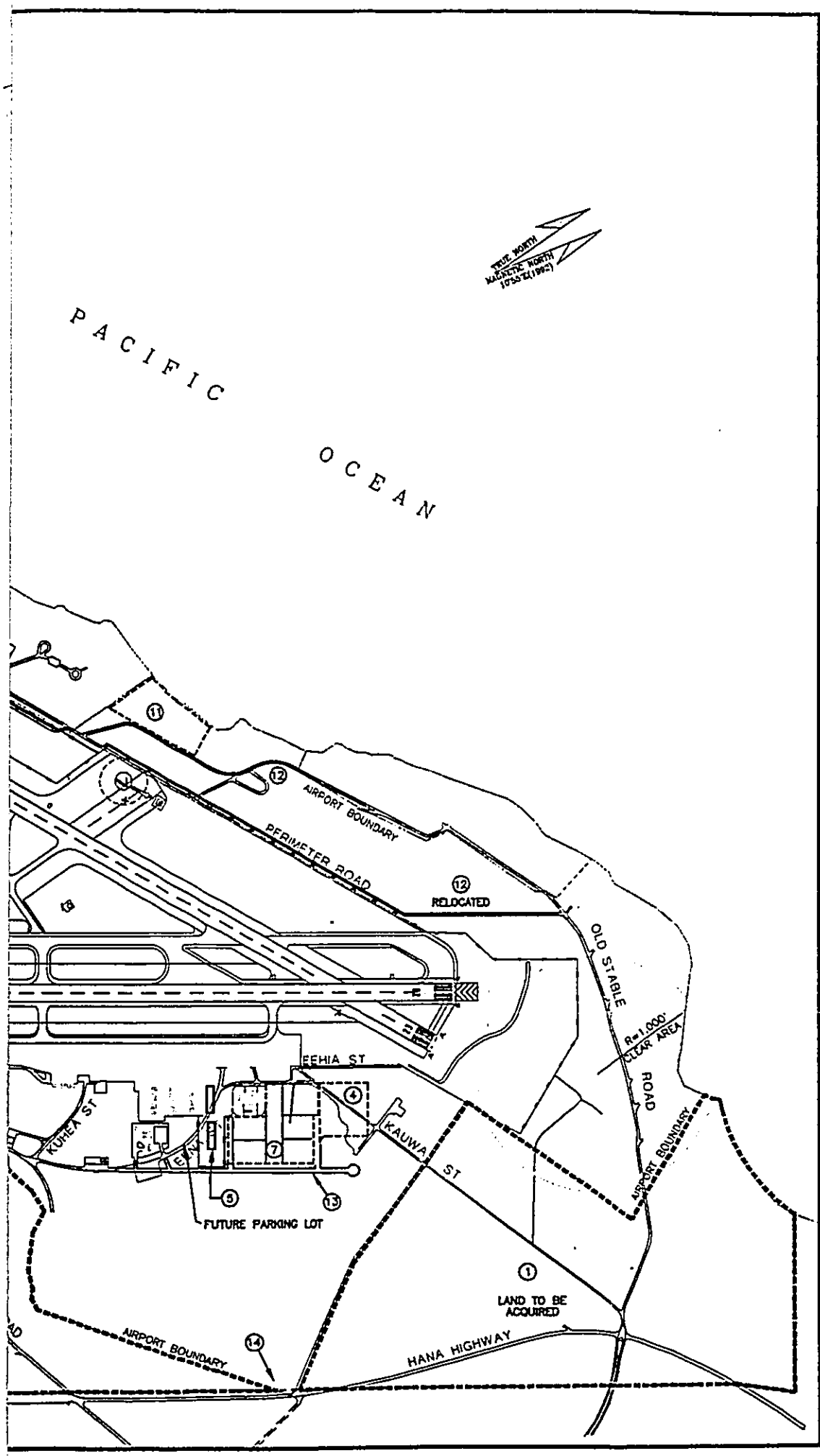


DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND FOR FUTURE DEVELOPMENT

1 LAND FOR NEW PARALLEL RUNWAY AND RUNWAY PROTECTION ZONES AND REALIGNMENT OF HANA HIGHWAY
2 AVIGATION EASEMENT FOR RUNWAY PROTECTION ZONE SOUTH OF HANA HIGHWAY
3 LAND FOR CARGO EXPANSION
4 CONSTRUCT NEW CARGO FACILITY ON EAST RAMP
5 ADDITIONAL T-HANGARS
6 NEW SCENIC AIR TOUR FACILITIES
7 COMMERCIAL AVIATION LEASE LOTS AT EAST RAMP AREA
8 RELOCATE AIRLINE GROUND SUPPORT EQUIPMENT FACILITY
9 EXPAND GROUND TRANSPORTATION FACILITIES
10 RELOCATE GROUND TRANSPORTATION FACILITIES IN RUNWAY & RUNWAY PROTECTION ZONE
11 EXPAND KANAHA BEACH PARK
12 ROADWAY TO CONNECT ALAHAO STREET WITH OLD STABLE ROAD
13 NORTH SECTION OF EAST RAMP ACCESS ROAD
14 EXTEND PERIMETER SERVICE ROAD AND FENCING AROUND NORTHWEST SIDE OF AIRPORT

0 500 1000 1500
GRAPHIC SCALE IN FEET

SOURCE:
KAHULUI AIRPORT MASTER PLAN

Edward K. Noda and Associates, Inc.

ALIEN SPECIES BIOLOGICAL ASSESSMENT FOR KAHULUI AIRPORT MASTER PLAN IMPROVEMENTS

PROPOSED PHASE 2 DEVELOPMENTS

DATE	FIGURE
JANUARY, 1997	2-2

- Interim Helicopter Facility.
- Utility and infrastructure improvements, including, construct East Ramp sewer system, install undergrown communications and electrical utilities along Hana Highway, and install non-potable water system.

2.3 PHASE 2 - YEAR 2003 TO 2008

The following projects are included in Phase 2:

- Acquire land (490 acres) for New Parallel Runway and Runway Protection Zones and Realignment of Hana Highway.
- Acquire Avigation Easement for Runway Protection Zone south of Hana Highway.
- Acquire land for West Side Cargo Facilities.
- Construct New Cargo Facility on East Ramp.
- Construct Additional T-Hangers.
- New Scenic Air Tour Facilities.
- Commercial Aviation Lease Lots at East Ramp.
- Relocate Airline Ground Support Equipment Maintenance Facility.
- Expand Ground Transportation Facilities.
- Relocate Ground Transportation Facilities in Runway 5 Runway Protective Zone.
- Expand Kanaha Beach Park.
- Emergency Roadway to connect Alahao Street with old Stable Road.
- North Section of East Ramp Access Road.
- Extend Perimeter Service Road and Fencing Around Northwest Side of Airport.
- Utility and infrastructure improvements

2.4 PHASE 3 - YEAR 2009 TO 2016

The following projects are included in Phase 3. As noted previously in this BA and in the Kahului Airport Improvments 1996 EIS (U.S. Department of Transportation, 1996), additional environmental documentation may be required for Phase 3 items prior to their initiation.

- Construct 8,600-Foot Parallel Runway 2R-20L and Taxiways, and Install Navaids.
- Extend Parallel Taxiway for Runway 5-23.
- Extend East Side Parallel Taxiway for Runway 2R-20L.
- Widen Runway Safety Areas for Runways 2L-20R and 5-23.
- Construct Transient Aircraft Parking Apron.
- Construct Additional Air Cargo Facilities on West Side.
- Fuel Line From Harbor.
- Expand New Ground Transportation Facilities.
- Expand Passenger Terminal Parking Lot.
- Construct East Ramp Access Road From Hana Highway.
- Construct Perimeter/Service Road and Fencing Around New Runway 2R-20L.
- Re-Channel Kalialinui Gulch for Parallel Runway.
- Realign Hana Highway at Northwest End of Airport.
- Provide Lease Lot for Flight Kitchen.
- Commercial Aviation Lease Lots.

SECTION 3
THE PROPOSED ACTION AREA

3.1 THE DIRECT ACTION AREA (KAHULUI AIRPORT ENVIRONS)

In conformance with 50 CFR Part 402, for the purposes of this BA, the direct action area is defined as the Kahului Airport environs (Figure 3-1), and the indirect action area is the remainder of Maui[1]. Geographically, the Airport environs are bordered to the north by the Pacific Ocean, to the west by the light industrial areas of Kahului, and to the south and east by sugar cane fields. Kanaha Beach Park and the Spreckelsville Beach Lot Properties occupy ocean frontage along the northern boundary. The Airport environs encompass approximately 1,447 acres, including the 235-acre Kanaha Pond Wildlife Sanctuary (KPWS), which is a National Natural Landmark (Figure 3-2). The agricultural areas have been in use for over five decades and, at one time, almost completely surrounded the airport area.

Climatically, the airport environs are characterized by an equable temperature regime, marked seasonal variation in rainfall, persistent surface winds from the northeast quadrant, and the rarity of severe storms. The range of temperature between August, the warmest month, and January, the coldest month, is 79.2° F to 71.5° F. Rainfall is normally relatively light and occurs mostly during the November through April rainy season. Annual rainfall is about 20 inches. Humidity is usually moderate to high throughout the year.

Northeast trade winds dominate the wind pattern within the Airport environs and provide excellent ventilation for the area. The trade wind flow is most prevalent during the dry season, while variable winds occur primarily during the wet season. However, trade winds occur more than 50 percent of the time during the wet season. The normal trade winds, accentuated by the funneling effect of Haleakala and the West Maui Mountains, may attain speeds of up to 40 miles per hour (mph). Occasional strong southerly (Kona) winds occur with the passage of storms during the winter months.

3.1.1 Kanaha Pond Wildlife Sanctuary

Kanaha Pond Wildlife Sanctuary (KPWS) is located southwest of Runway 5-23 and is separated from the Airport by Kalialinui Gulch and an A&B Ditch. The KPWS, which is on Airport property, is managed by the State of Hawaii, Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW), under a Memorandum of Agreement between the FAA, HDOTA, and DLNR, signed in 1973. In August, 1996, HDOTA and DLNR entered into a Memorandum of Understanding which set the boundaries of the 235 acre KPWS and delegated to DLNR the responsibility for managing KPWS in accordance with Federal and State laws, particularly, the Endangered Species Act

[1] 50 CFR 402.12 defines "action area" as all areas to be affected directly or indirectly by the Proposed Project and not merely the immediate area involved in the project.

of 1973, as amended. KPWS contains wetlands and listed and candidate species of birds [Hawaiian Duck (*Anas wyvilliana*), Hawaiian Black-necked Stilt (*Himantopus mexicanus knudseni*), and Hawaiian Coot (*Fulica alai*)].

3.1.2 Flora of Interest in Direct Action Area

While much of the Hawaiian landscape has been drastically changed by man (Sohmer and Gustafson 1994), in general there are about 150 vegetation communities grouped into five altitudinal zones (Gagnè and Cudidihy 1990) (Figure 3-3):

- Coastal;
- Lowland;
- Montane;
- Subalpine; and
- Alpine.

The Airport environs are generally considered to lie within the Coastal zone. Based on the vegetation surveys conducted for the Kahului Airport Master Plan Improvements [see Section 3.11, 1996 EIS (U.S. Department of Transportation 1996)], there are six vegetation communities within the Airport area: (1) wetlands; (2) cane field/ruderal borders; (3) koa haole (*Leucaena leucocephala*) scrub/mixed understory; (4) open grassland; (5) kiawe (*Prosopis pallida*)/mixed understory; and (6) wind-sheared dune vegetation (Figure 3-4).

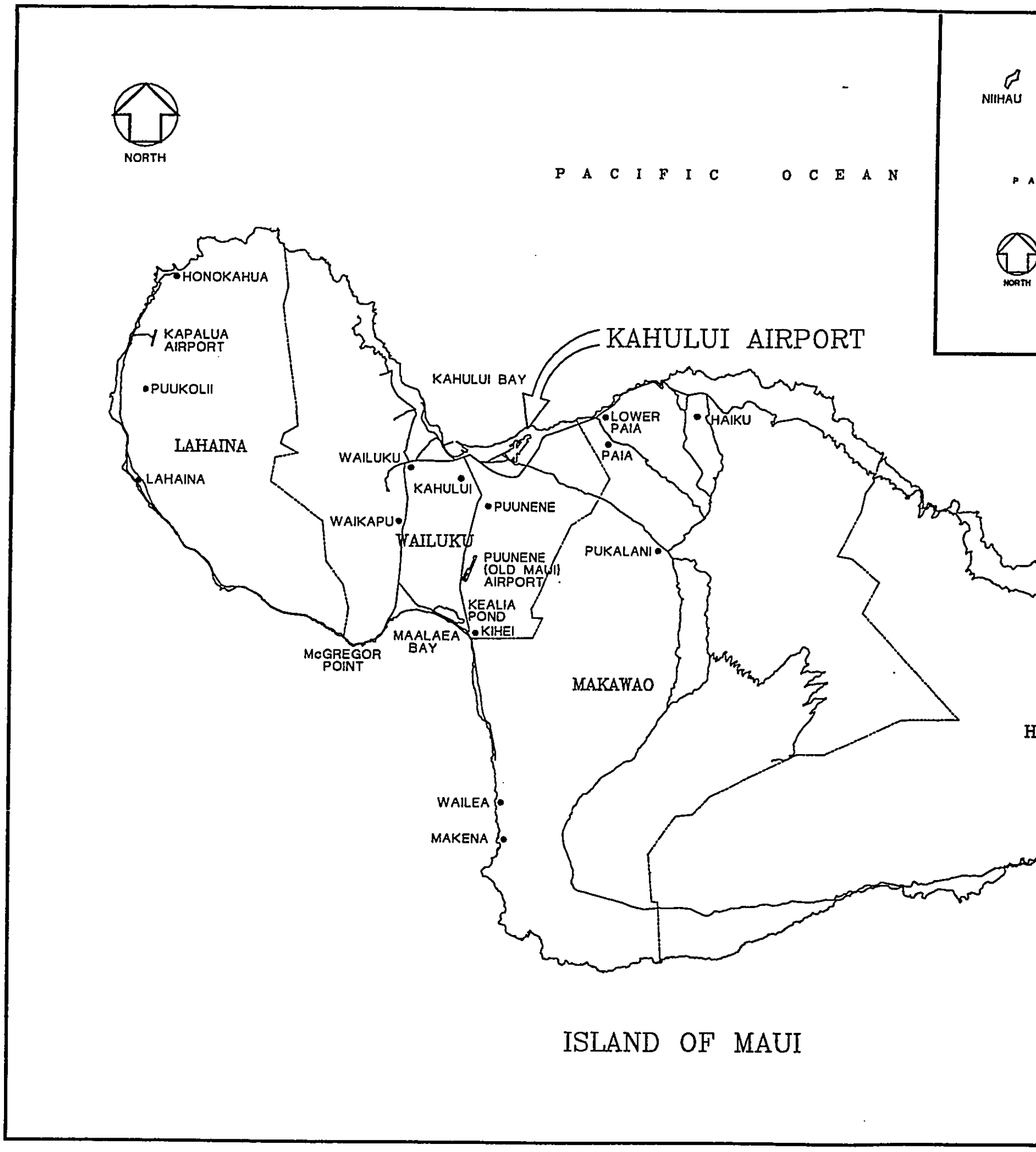
The Airport environs, with the possible exception of KPWS, do not contain any listed or candidate plant species or critical habitats.

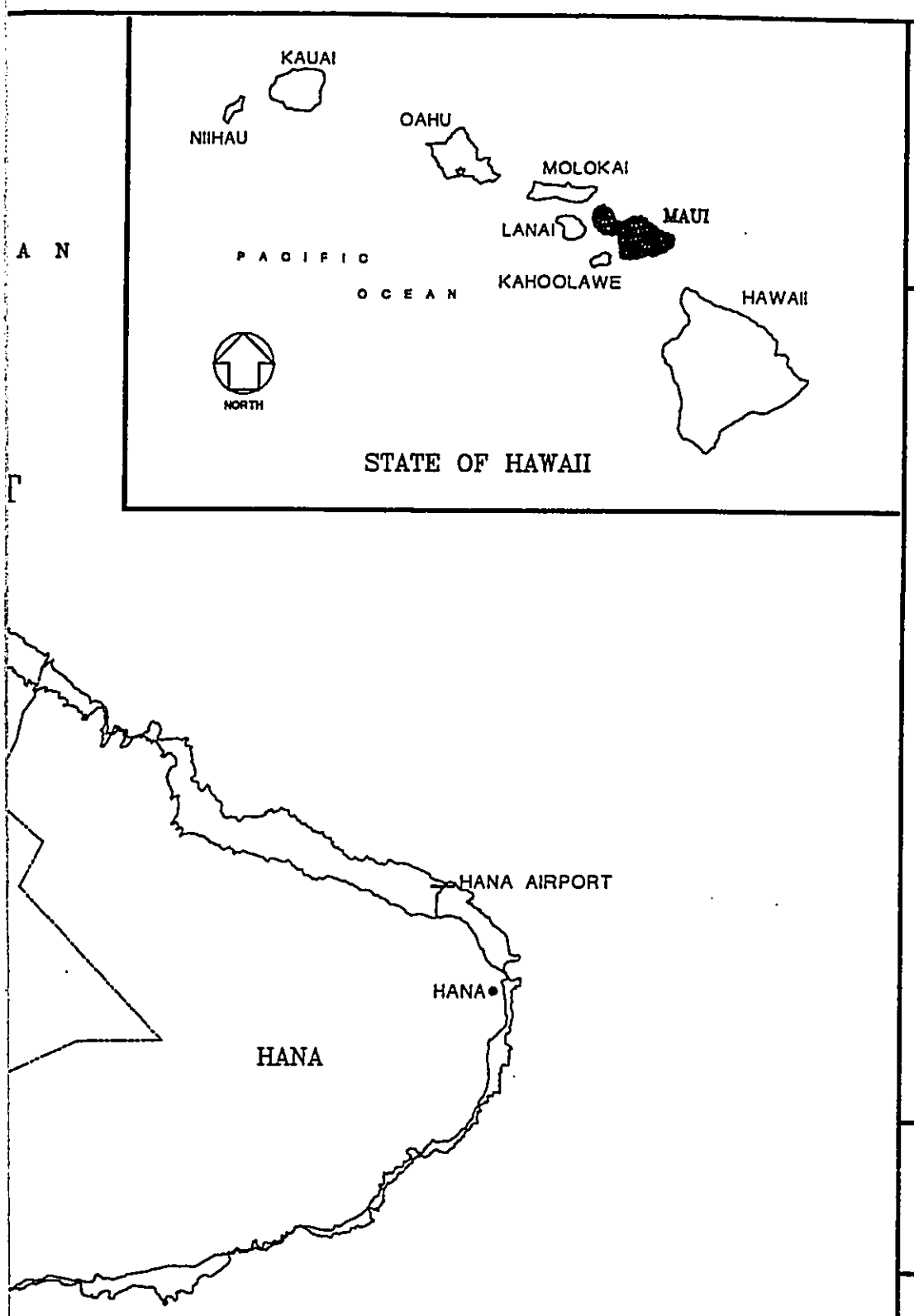
3.1.3 Fauna of Interest in Direct Action Area

Several feral bird and mammal surveys of the Airport area have been conducted since the early 1970's (Berger 1972; Bruner 1981; and Bruner 1990). Resident endemic endangered birds recorded at the KPWS include the endangered Hawaiian Black-necked Stilt and Hawaiian Coot.

The endangered Hawaiian Duck or Koloa and Hawaiian Owl (Pueo) (*Asio flammeus sandwichensis*) occur in and around the airport and KPWS. Other bird species occurring at KPWS or in and around the airport include the Semipalmated Plover (*Charadrius semipalmatus*) and feral Mallards (*Anas platyrhynchos*).

Migratory indigenous birds sighted at the airport and environs include the Pacific Golden Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*), Wandering Tattler (*Heteroscelus incanus*) and the Sanderling (*Calidris alba*). The resident indigenous Black-


NORTH
PACIFIC OCEAN
NIIHAU
NORTH
KAHULUI AIRPORT
HONOKAHUA
KAPALUA AIRPORT
PUUKOLII
LAHAINA
LAHAINA
KAHULUI BAY
WAILUKU
KAHULUI
WAIKAPU
WAILUKU
PUUNENE
PUUNENE (OLD MAUI) AIRPORT
KEALIA POND
KIHEI
MAALAEA BAY
McGREGOR POINT
LOWER PAIA
PAIA
HAIKU
PUKALANI
MAKAWAO
WAILEA
MAKENA
ISLAND OF MAUI



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND
DISTRICT BOUNDARY

0 1 2 3 4 5 6
GRAPHIC SCALE IN MILES

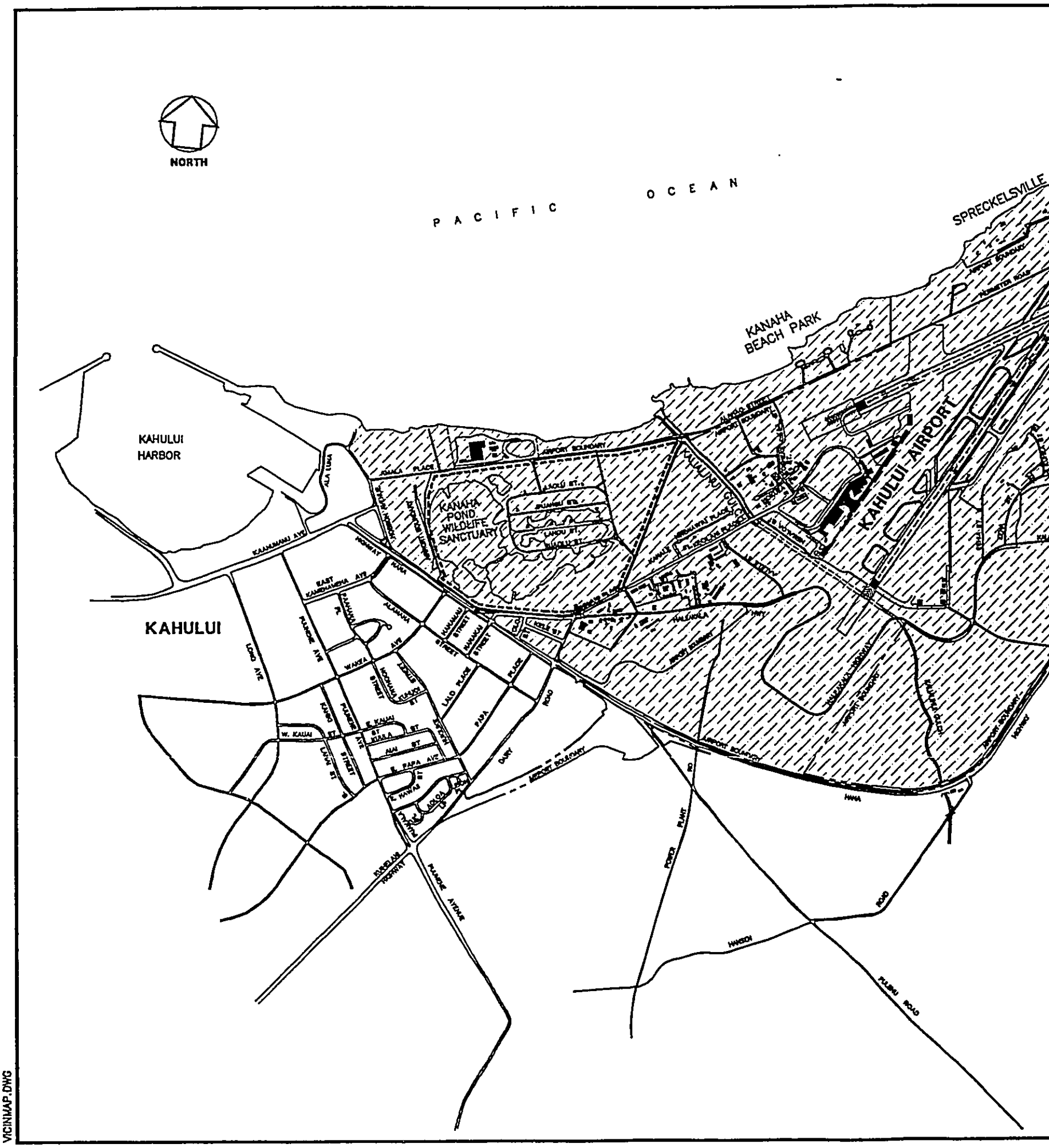
Edward K. Noda and Associates, Inc.

ALIEN SPECIES
BIOLOGICAL ASSESSMENT
FOR
KAHULUI AIRPORT
MASTER PLAN IMPROVEMENTS

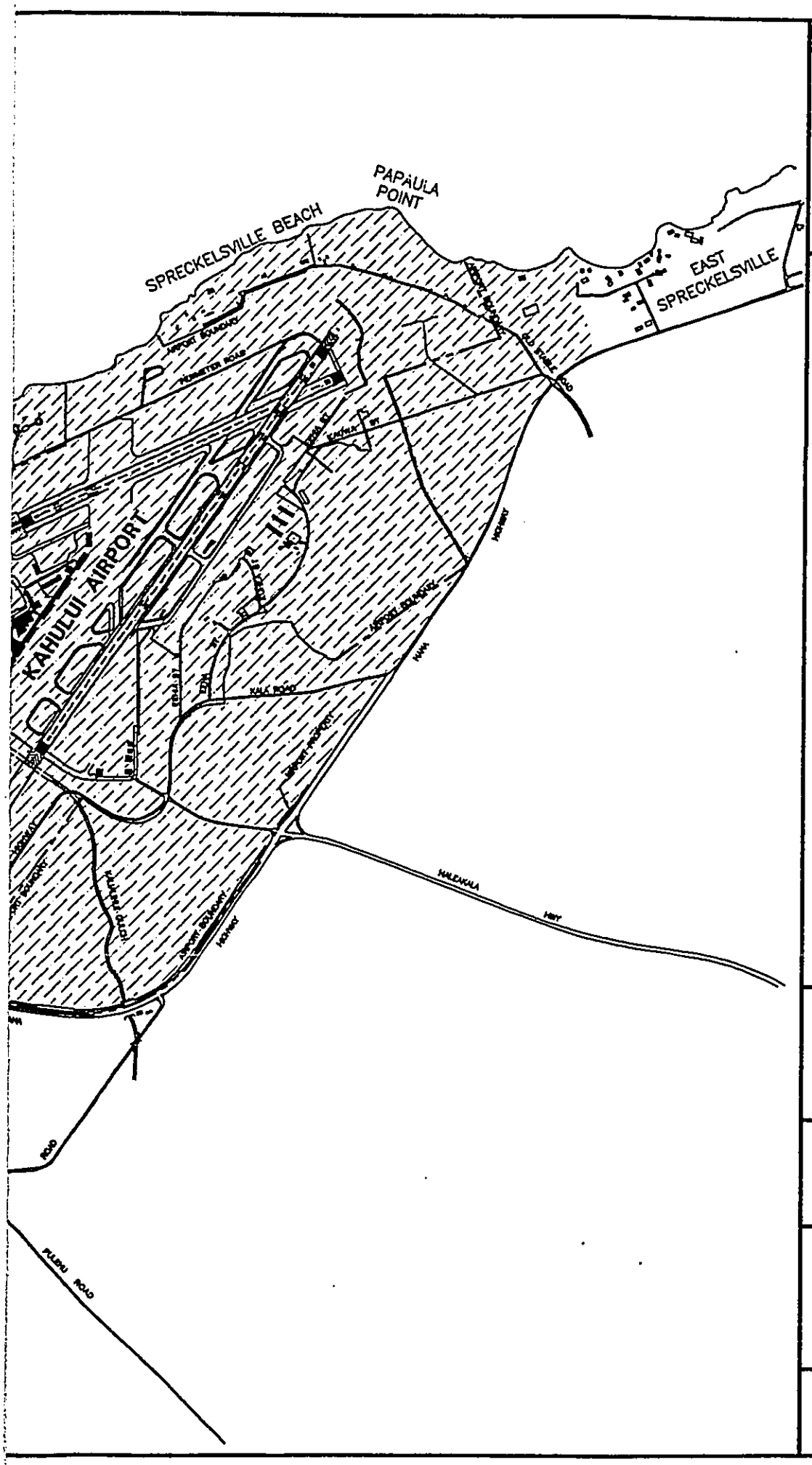
LOCATION MAP

DATE	FIGURE
NOVEMBER, 1996	3-1

DOCUMENT CAPTURED AS RECEIVED



VICINMAP.DWG



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND

KANAHA POND WILDLIFE SANCTUARY BOUNDARY

AIRPORT BOUNDARY

KAHULUI AIRPORT ENVIRONS

0 1000 2000 3000
GRAPHIC SCALE IN FEET

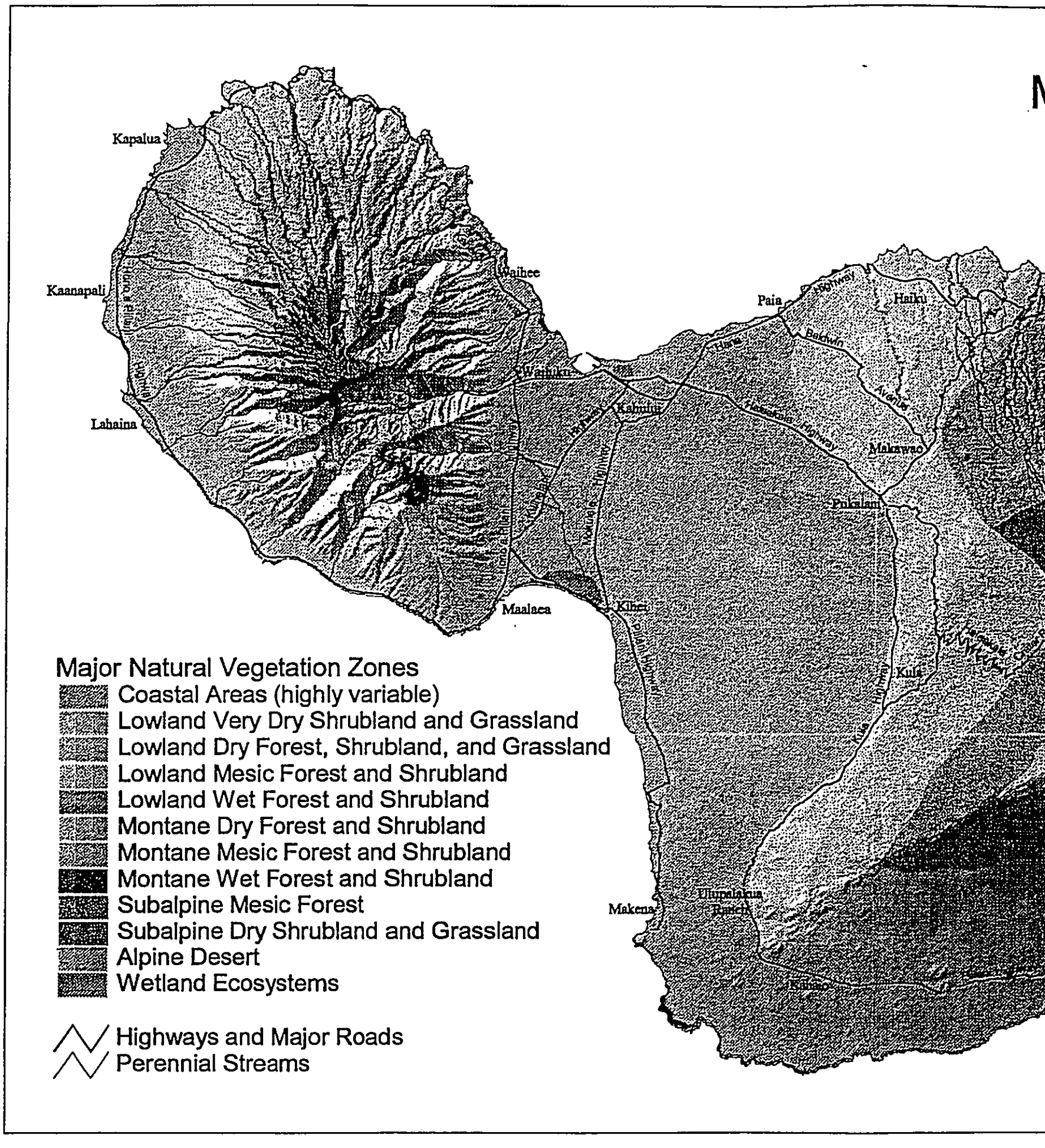
Edward K. Noda and Associates, Inc.

ALIEN SPECIES BIOLOGICAL ASSESSMENT FOR KAHULUI AIRPORT MASTER PLAN IMPROVEMENTS

VICINITY MAP

DATE	FIGURE
NOVEMBER, 1996	3-2

DOCUMENT CAPTURED AS RECEIVED



Major Natural Vegetation Zones
Island of Maui

Note: Vegetation zones were derived using elevation, moisture regime, and dominant vegetation type. Coastal zones are approximations of variable, narrow bands of habitat strongly influenced by the sea.

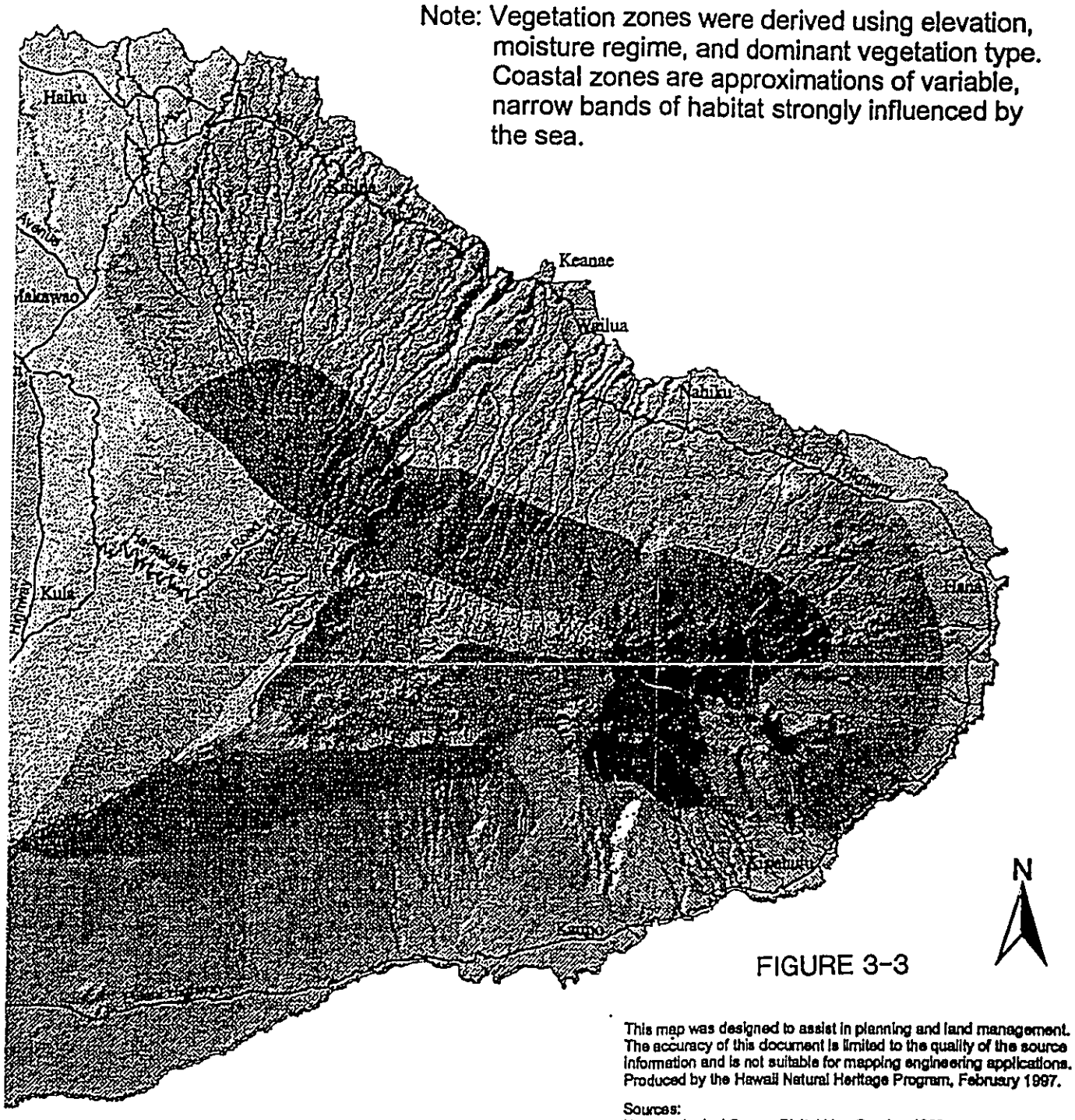
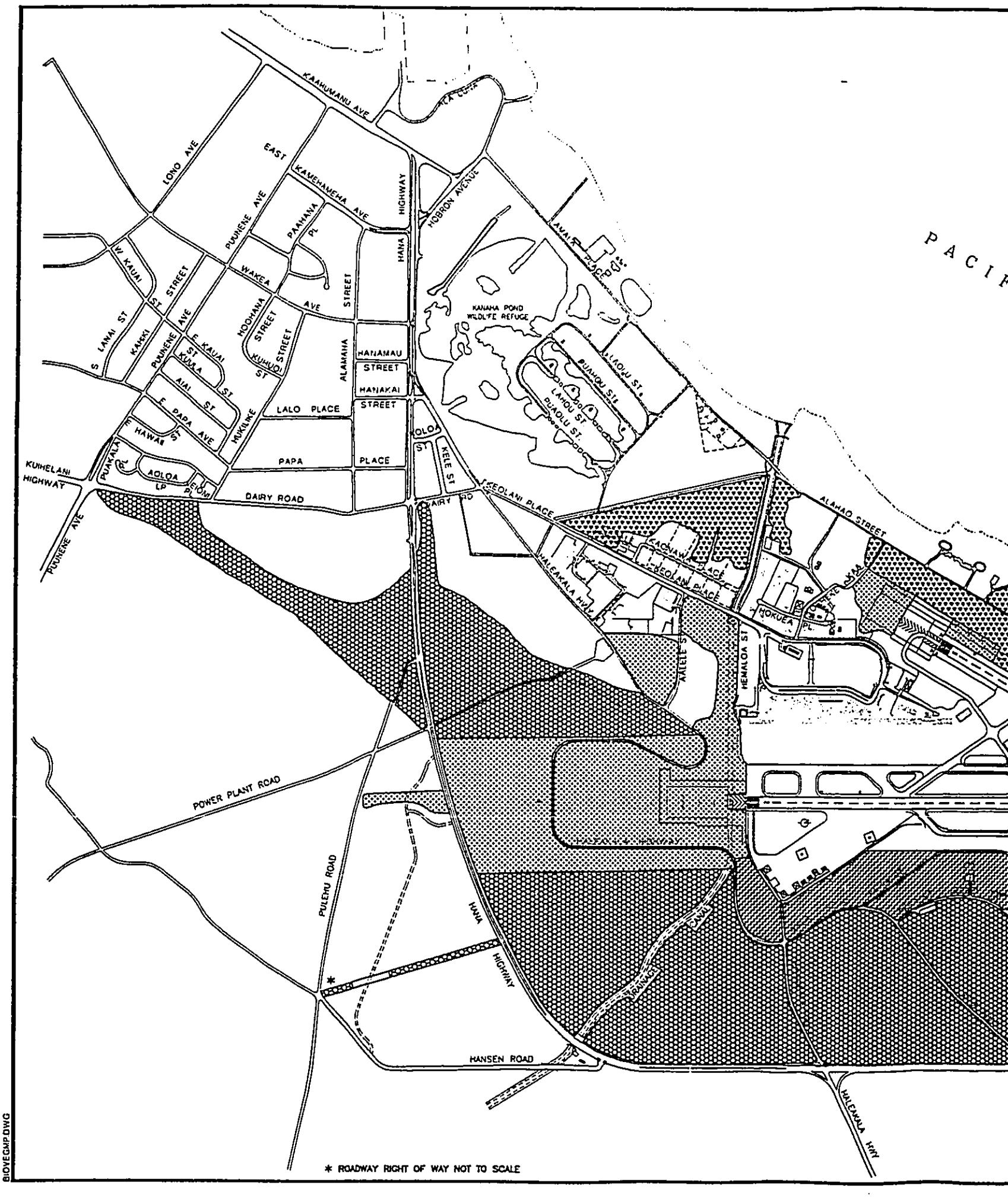


FIGURE 3-3

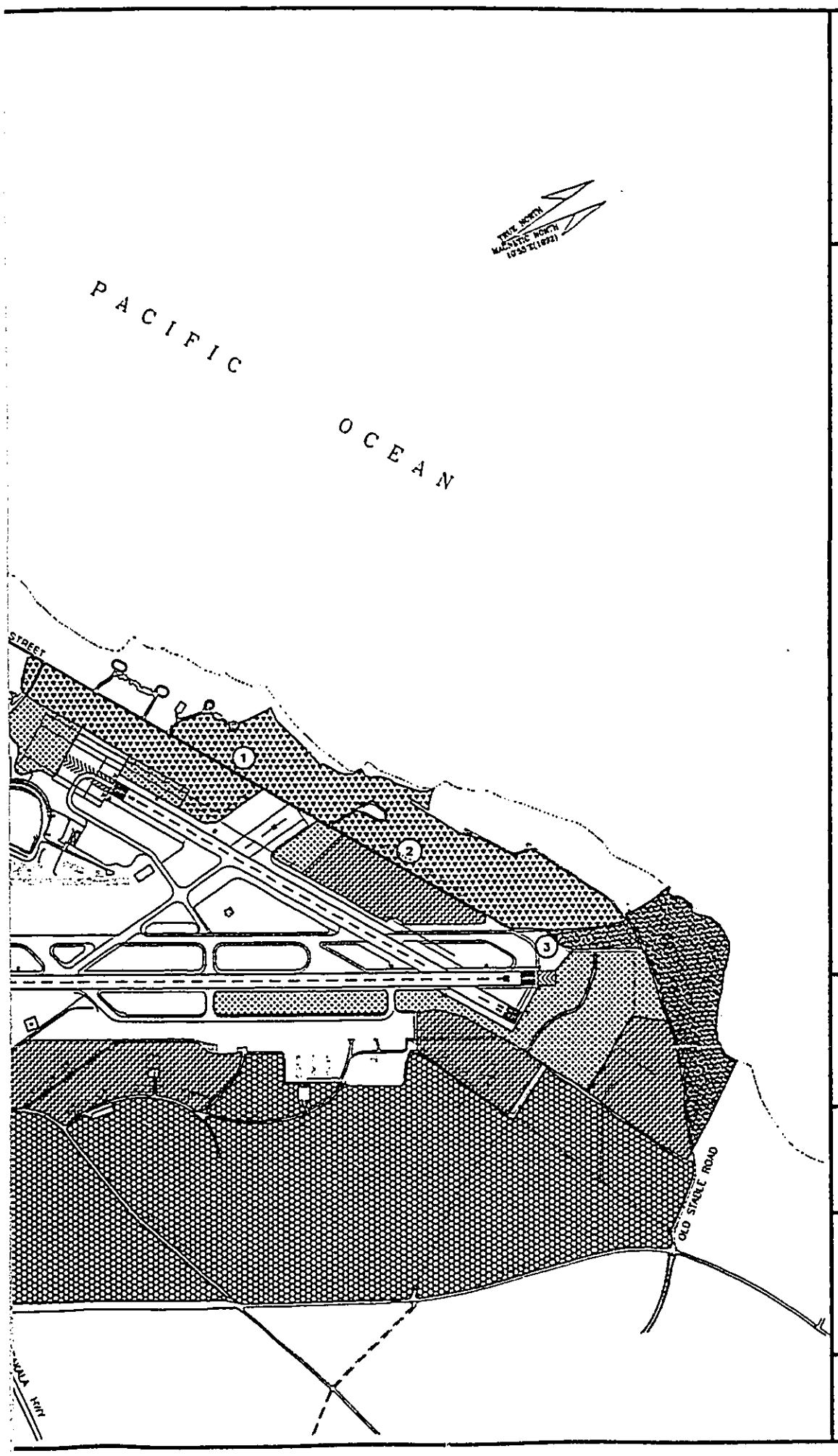
This map was designed to assist in planning and land management. The accuracy of this document is limited to the quality of the source information and is not suitable for mapping engineering applications. Produced by the Hawaii Natural Heritage Program, February 1997.

Sources:
U.S. Geological Survey Digital Line Graphs, 1983.
U.S. Geological Survey Digital Elevation Model, 1983.
Natural Community data compiled by the Hawaii Natural Heritage Program.

0 2.5 5 Miles



BIOVEGMP.DWG



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

LEGEND:

- WIND SHEARED DUNE VEGETATION
- KEAWE/MIXED UNDERSTORY
- OPEN GRASSLAND
- KOA HAOLE SCRUB/ MIXED UNDERSTORY
- CANE FIELDS/RUDERAL BORDERS
- ① ② ③ LOCATION OF WETLANDS (NOT ACTUAL SIZE)

0 1000 2000
GRAPHIC SCALE IN FEET

Edward K. Noda and Associates, Inc.

ALIEN SPECIES
BIOLOGICAL ASSESSMENT
FOR
KAHULUI AIRPORT
MASTER PLAN IMPROVEMENTS

VEGETATION
MAP

DATE	FIGURE
NOVEMBER, 1996	3-4

crowned Night Heron (*Nycticorax nycticorax*) is also found in the airport area, as are 14 species of exotic (introduced) birds.

The Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*), a pelagic endangered seabird nests at Haleakala National Park. It is possible the Dark-rumped Petrel overflies Kahului Airport while flying to and from its nests, however, none have been sighted at the airport.

Feral mammals inhabiting or frequenting the airport area include feral cats (*Felis domesticus*) and the Small Indian Mongoose (*Herpestes auropunctatus*). It is also likely that rats and mice inhabit the area. The endangered Hawaiian Hoary Bat (*Lasiurus cinerus semotus*) has not been observed in the airport area.

The Airport environs, with the exception of KPWS, do not contain any listed or candidate animal species or critical habitats.

3.2 INDIRECT ACTION AREA (ISLAND OF MAUI)

3.2.1 Maui in General

The introduction of alien species into Maui could affect the natural, agricultural, and human environment of the entire island[3]. Approximately 53 percent of the 729 square mile island is devoted to agriculture, with an annual crop value of $140 million in 1992. The remaining 47 percent of the island consists of disturbed, as well as some of the most intact native Hawaiian ecosystems in Hawaii.

The resident population of Maui has increased from 39,000 in 1970 to 95,000 in 1990. Annual tourist visitation to the island has increased from 169,000 in 1957 to over 2 million in 1990. Growth of the local population and increasing commerce between Maui and the other Hawaiian islands, the mainland U.S., and other countries, has resulted in a coincident increase in the introduction of potentially invasive plant and animal species. Since the 1970's, an average of 20 new species of alien invertebrates have established in Hawaii every year (The Nature Conservancy of Hawaii and Natural Resources Defense Council 1992). Over 8,000 species of alien plants have already been brought into Hawaii and purposeful and inadvertent introductions continue (Smith 1985). Fortunately, not all of these introductions will adversely affect surviving native biota and relatively few will threaten the pristine, high-elevation native ecosystems.

Increasingly, concerted efforts are being made to slow the flow of alien species through Federal and State quarantine and reporting procedures, as well as visitor industry and general public education programs. However, serious "leaks" still occur (The Nature

[3] As indicated in Section 1, this BA is primarily concerned with the potential effects of alien species that may be introduced to Maui as a result of the Proposed Project, on listed or candidate species of plants and animals or listed or proposed critical habitats. However, additional information regarding the potential effects on agriculture and the health and welfare of the public is presented where it is relevant to the discussion.

Conservancy of Hawaii and Natural Resources Defense Council 1992). A recent recovery plan for 21 endangered plant species on Maui (U.S. Fish and Wildlife Service 1996) identified the primary current threats as alien animals and plants and coastal development.

Oceanic island ecosystems in general, and the Hawaiian Islands in particular, are highly susceptible to damages caused by humans and the alien plants and animals they bring with them. Because of their evolution in relative isolation and in the absence of many forces shaping continental organisms, ecosystems of the Hawaiian Islands are particularly vulnerable to invasion by alien species from continents. Although habitat destruction has been an important cause of extinction and endangerment, the introduction of alien species has contributed in a major way in the past and is now the predominant cause of biodiversity loss in Hawaii (Loope 1996).

Much has been written about the loss of Hawaiian flora and fauna. The extent of the losses (*e.g.*, over 70 percent of endemic land birds and land snail species) is unequaled in any other region of the U.S. Hawaii is well known as the extinction capital of the U.S., with one-third of the listed endangered species in the entire country. Few areas in the world have suffered such negative effects of biological invasions as Hawaii. Yet much remains to be lost. Much of Hawaii's unique biological heritage remains and can be protected, given serious effort to control the flow of alien species. Large tracts of near pristine ecosystems remain at high elevations. Even with the high incidence of extinction and endangerment in the Hawaiian Islands, Hawaii has more non-endangered endemic species of vascular plants, birds, and insects than any other State except California.

The animals and plants of the Hawaiian Islands are an important part of Hawaii's, America's, and the world's natural heritage, and comprise a valuable natural resource. They hold back the soil from washing into the sea, and provide for gradual release of runoff water. Hawaiian ecosystems are important for Hawaii's economic health, because their maintenance ensures Hawaii's sustained beauty and uniqueness. Preservation of Hawaiian native ecosystems, maintaining Hawaii's distinctiveness from other tropical areas throughout the world, is good business for Hawaii's future.

A remarkable diversity of habitats occurs within a 20-mile radius of Kahului Airport. There is a favorable physical climate somewhere on Maui to suit the great majority of the world's 1.7 million+ described species of plants and animals. Mean annual temperature on Maui ranges from about 78° F at Kahului to about 47° F at the summit of Haleakala. Snow occasionally occurs on Haleakala, down to an elevation of about 8,000 feet (2,438 meters). Frost occurs down to 4,000 feet (1,220 meters) during the coldest winter nights. (Many species that are native to a place where winters are cold manage to thrive without the cold winters.) Mean annual rainfall ranges from less than 19 inches at Kihei and Lahaina to about 400 inches at 5,000 to 6,000-foot elevation on parts of both East and West Maui.

The greater part of the higher elevation ecosystems (above 2,000 to 3,000 feet) (610 to 915 meters) of both East and West Maui, primarily rain forest and mesic forest, are receiving active ecosystem management and are important reservoirs for biodiversity.

Haleakala National Park, an International Biosphere Reserve, is afforded special legal protection by federal laws and can justifiably claim that it is among the most important reserve sites in the U.S. for conservation and biodiversity. However, other state and private reserves, *e.g.*, Waikomoi, Hanawi, Kapunakea, and Pu'u Kukui on East and West Maui (Figure 3-5), although lacking comparably stringent legislation, are of comparable biological importance and complement the Park's role in ecosystem protection and protection of biodiversity. As a result of Maui's surviving diverse, relatively intact ecosystems, it has much more to lose from new alien species introductions than other Hawaiian Islands with less diverse ecosystems.

Although the purpose of this BA is to evaluate the potential effects of the Proposed Project on listed and candidate plant and animal species and designated or proposed critical habitats, continued invasion of alien species to the Hawaiian Islands will result in the continued erosion of populations of the more common, non-listed or candidate species. It is the non-listed and candidate species that currently predominate in the ecosystem and contribute the most toward biodiversity and ecosystem functioning.

If alien species continue to be introduced into Maui, damage to already listed endangered species would be but a small part of the damage to biodiversity and ecosystem functioning. The concept that already listed or candidate species can serve as a meaningful surrogate to assess the impact of alien species for the ecosystem, as a whole, has validity. However, preventative and/or control measures aimed exclusively at species given special legal status on Maui may be limited and could result in inadequate protection for Maui's native ecosystems.

Approximately 450 flowering plant species, 120 ferns, 60 vertebrate animals, and 3,000 invertebrate species are native to Maui (Loope 1996). As many as 20 percent of these are or may be extinct, with extinctions especially high among the birds, land snails, and the biota of the dryland forest ecosystem (Loope 1996). The FWS has listed 190 plants and 127 animals on Maui (see Section 4, Tables 4-1 and 4-2) as receiving some level of protection under the Endangered Species Act. There are no designated or proposed critical habitat on Maui.

3.2.2 Haleakala National Park

The 44 square mile Haleakala National Park, which, as noted previously, is designated an International Biosphere Reserve, contains some of the least disturbed ecosystems on Maui and is dominated by native species. The 10,023-foot (3,055 meters) summit of Haleakala is 17 miles from the airport. The National Park Service at Haleakala National Park has noted their concerns over the effect of alien species in the park and on Maui. Appendix C, prepared by Dr. L. L Loope for this BA, describes the NPS concerns.

The native biota includes about 240 native species of flowering plants, with approximately 90 percent endemic to Hawaii and 20 percent endemic to Maui, 100 species of ferns, with approximately 50 percent endemic to Hawaii, 800 species of native

invertebrates, with approximately 90 percent endemic to Maui, one endemic mammal, a Federally endangered species of hoary bat, and eight endemic forest bird species in the family Fringillidae, subfamily Drepanididae (Hawaiian Honeycreepers) (Loope 1996). The Park provides habitat for six Federally endangered bird species, 12 Federally endangered plant species, 37 plant species with various levels of concern, and numerous rare endemic invertebrate species, some of which are "species of concern" recognized by FWS (Section 4, Table 4-1). The following brief synopsis of habitats within Haleakala National Park represent a sample of the natural habitats on Maui.

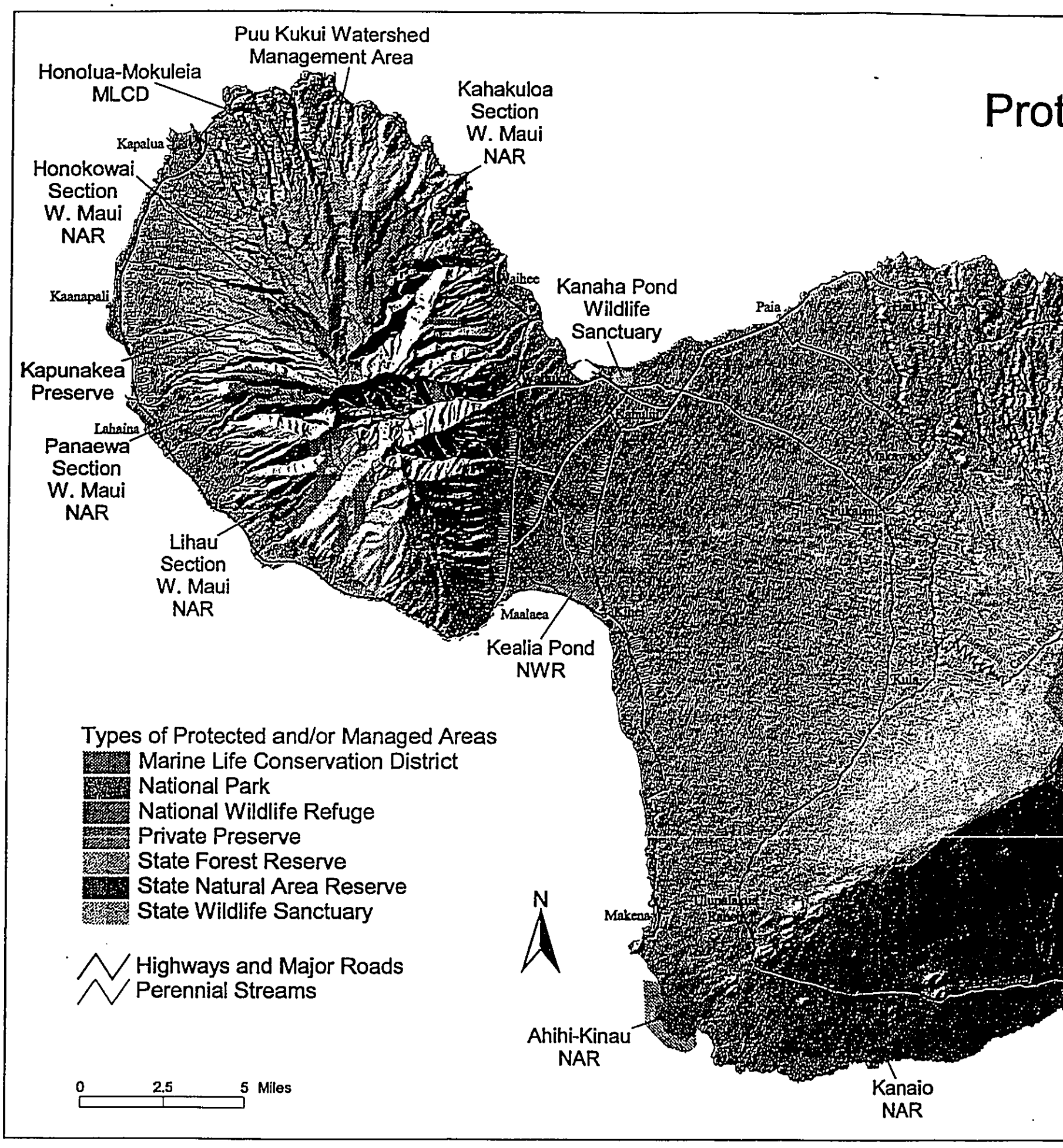
The young volcanic surface of upper Haleakala volcano (7,000 to 10,000-foot elevation) (2,134 to 3,048 meters) has sparse vegetation. While rainfall sinks rapidly into the cindery ground, the bare ground surface becomes warm during sunny days and cools near freezing at night. Few plant species are able to establish seedlings in these conditions and plant cover is less than 5 percent over large areas. This is the habitat of the Haleakala silversword (*Argyroxiphium sandwicense* subsp. *macrocephalum*) and a few hardy endemic shrubs and grasses. Unique insect and spider communities can thrive without plants in this aeolian (windy) zone through feeding on wind-imported insects from lower elevations.

Subalpine shrubland (4,000 to 9,000-foot elevation) (1,220 to 2,743 meters) vegetation comprised of about 10 to 15 species of endemic shrubs and grasses, covers extensive areas below the aeolian zone, but above the upper rain forest treeline and dryland forest. Where the soils are deep, shrubs grow densely, forming thickets. On shallow soils, which are especially prevalent at higher elevations, shrubs are sparse. Subalpine shrublands are dominated by pukiawe (*Styphlia tameiameiae*), mamane (*Sophora chrysophyla*), ohelo (*Vaccinium reticulatum*), and pilo (*Coprosma montana*).

Rain forest occupies the eastern half of the park, in areas with average annual rainfall of 120 to 400 inches and frequent cloud cover. 'Ohi'a (*Metrosideros polymorpha*) is the dominant tree at 4,000 to 7,000-foot elevation (1,220 to 2,134 meters). At 2,000 to 4,000-foot elevation (610 to 1,220 meters), 'ohi'a is mixed with koa (*Acacia koa*). A diverse array of smaller trees, ferns, shrubs, and herbs occurs in Hawaiian rain forests. Because of the high rainfall, many species are able to grow epiphytically, on the trunks and branches of trees and tree ferns. Also, a unique bog vegetation occurs in rainforest areas that have poor drainage.

A small remnant of dryland forest occurs within Haleakala National Park in Kaupo Gap below 5,000-foot elevation (1,524 meters). The dryland forest zone is mostly outside the Park on the leeward slopes of Haleakala. Browsing animals, grass invasions, and fire have drastically reduced the extent of dryland forest on Maui, but diverse remnants persist on the southwestern flank of Haleakala.

Although the lowland zone of Haleakala National park at Kipahulu (below 2,000 feet) (610 meters) has been more heavily modified by humans than any other part of the Park, largely intact stream ecosystems and native coastal vegetation remain.


Puu Kukui Watershed Management Area
Honolua-Mokuleia MLCD
Kahakuloa Section W. Maui NAR
Kapalua
Honokowai Section W. Maui NAR
Kaanapali
Kapunakea Preserve
Lahaina
Panaewa Section W. Maui NAR
Lihau Section W. Maui NAR
Kanaha Pond Wildlife Sanctuary
Paia
Maalaea
Kealia Pond NWR
Kula
Makena
Ahihi-Kinau NAR
Kanaio NAR
Types of Protected and/or Managed Areas
Marine Life Conservation District
National Park
National Wildlife Refuge
Private Preserve
State Forest Reserve
State Natural Area Reserve
State Wildlife Sanctuary
Highways and Major Roads
Perennial Streams
N
0
2.5
5 Miles

Protected and/or Managed Areas
Island of Maui

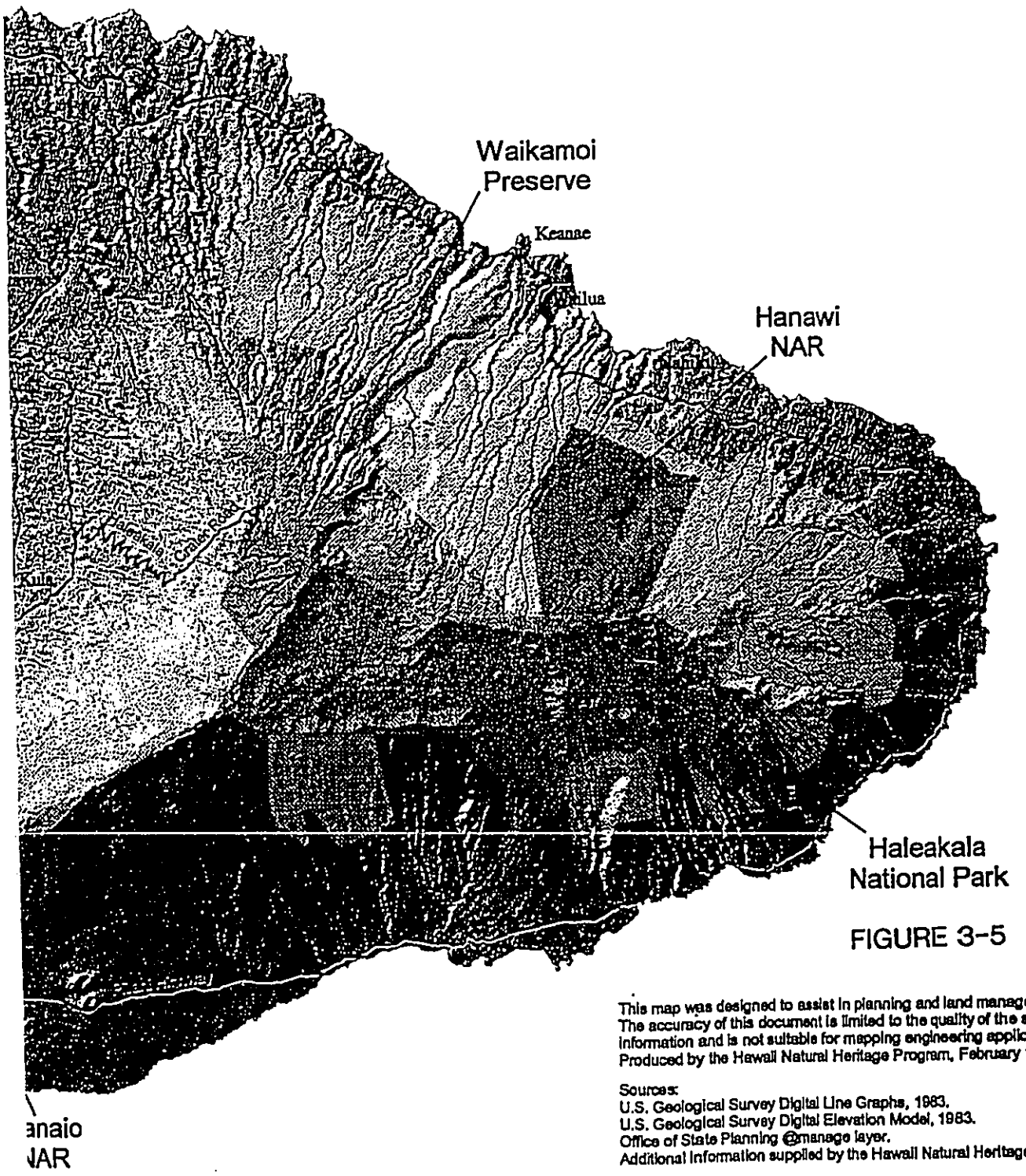


FIGURE 3-5

This map was designed to assist in planning and land management. The accuracy of this document is limited to the quality of the source information and is not suitable for mapping engineering applications. Produced by the Hawaii Natural Heritage Program, February 1997.

Sources:
U.S. Geological Survey Digital Line Graphs, 1983.
U.S. Geological Survey Digital Elevation Model, 1983.
Office of State Planning @manage layer.
Additional information supplied by the Hawaii Natural Heritage Program.

SECTION 4
MAUI'S LISTED AND CANDIDATE SPECIES AND SPECIES OF CONCERN

Tables 4-1 and 4-2 list the current (January 1997) Maui Listed and Candidate Plant and Animal Species respectively. These tables have been modified to indicate the plant and animal species that occur in Haleakala National Park. Table 4-3 (updated January 1995) lists the Endangered and Threatened Animals of Hawaii. The State accepts the FWS listed and candidate plant species as its endangered and threatened plant species list.

TABLE 4-1

ISLAND OF MAUI'S PLANTS: UPDATED JANUARY 23, 1997

LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT.

Species status by island: E= endangered; T= threatened; P= formally proposed as E or T; C= candidate for listing R=recommended for listing (L) as E or T, or for candidacy (C); SOC= species of concern; *=possibly extinct in the wild; °=in cultivation; (CH)=critical habitat declared. ‡=N.W. Hawaiian Islands: Fr. Frigate, Kure; Laysan, Midway, Necker, Nihoa, Pearl & Hermes.

		Status				
		Status	No. of pops	No. of plants	Maui	found on other islands
LISTED PLANTS (Statewide: 273 endangered taxa, 10 threatened taxa)						
Abutilon menziesii	Ko'oloa'ula	E	10	350-400	✓	✓
Acaena exigua	Liliwai	E	0	0	✓°	✓°
Alectryon macrococcus var. *auwahiensis*	Mahoe	E	1	9	✓	
Alectryon macrococcus var. *macrococcus*	Mahoe	E	10	<300	✓	✓
Argyroxiphium sandwicense ssp. *macrocephalum*	'Ahinahina, Haleakala silversword	T	7	65,000	✓	*
Asplenium fragile var. *insulare*	No common name	E	8	295	✓°	✓°
Bidens micrantha ssp. *kalealaha*	Ko'oko'olau	E	4	<2,000	✓	✓ *
Bonamia menziesii	No common name	E	28	200	✓	✓
Brighamia rockii	Pua 'ala	E	3	100-200	✓°	✓°
Cenchrus agrimonioides var. *agrimonioides*	Kamanomano	E	6	<100	✓	✓
Centaurium sebaeoides	'Awiwi	E	7	80-110	✓	✓
Clermontia lindseyana	'Oha wai	E	15	225-325	✓	✓ *
Clermontia oblongifolia ssp. *mauiensis*	'Oha wai	E	1	1	✓	✓ *
Clermontia peleana ssp. *singulifolia*	'Oha wai	E	0	0	✓°	✓
Cnemidia sequamigera	Pauoa	E	7	80	✓	✓ *
Cyanea lobata	Haha	E	0	0	✓°	✓
Cyanea grimesiana ssp. *grimesiana*	Haha	E	14	<50	✓	✓
Cyanea macaldowneyi	Haha	E	6	>144	✓	
Delissea undulata ssp. *undulata*	No common name	E	1	1	✓°	✓
Diellia erecta	No common name	E	13	63	✓	✓
Diplazium molokaiense	No common name	E	1	1	✓	✓
Flueggea neowawraea	Mehamehame	E	28	127-167	✓	✓
Gardenia brighamii	Nanu	E	6	15-19	✓°	✓
Geranium arboreum	Nohoanu	E	4	>300	✓	*
Geranium multiflorum	Nohoanu	E	11	<3,000	✓	*
Gouania hillebrandii (CH)	No common name	E	3	1,700-2,100	✓	✓
Gouania vitifolia	No common name	E	1	5	✓°	✓
Haplostachys haplostachya	No common name	E	14	>10,000	✓°	✓
Hedyotis coriacea	Kio'ele	E	2	<20	✓	✓
Hedyotis mannii	No common name	E	2	11	✓	✓
Hesperomannia arborescens	No common name	E	18	<60	✓	✓
Hesperomannia arbuscula	No common name	E	6	86	✓	✓
Hibiscus brackenridgei ssp. *brackenridgei*	Ma'o hau hele	E	7	<60	✓	✓
Ischaemum byrone	Hilo ischaemum	E	10	1,200-2,200	✓	✓ *
Isodendrion pyrifolium	Aupaka, wahine noho kula	E	1	60-70	✓°	✓
Lipochaeta kamolensis	Nehe	E	1	<200	✓	
Lysimachia lydgatei	No common name	E	3	150-250	✓	
Marsilea pensacolaensis ssp. *pensacolaensis*	No common name	E	7	100	✓	✓
Melicope adscendens	Alani	E	1	4	✓	
Melicope balloui	Alani	E	1	<300	✓	*
Melicope knudsenii	Alani	E	6	24-34	✓	✓
Melicope macrophylla	Alani	E	1	<5	✓°	✓
Melicope ovalis	Alani	E	1	>300	✓	*
Neraudia sericea	No common name	E	2	100-150	✓	✓
Notochlaena lanosa	Kula'i	E	15	1,500-1,600	✓	✓
Panicum fauriei var. *carteri* (CH)	Carter's panic grass	E	4	>400	✓	✓
Pseudomon sandwicense	Makou	T	16	1,000-5,000	✓	✓

* Denotes species found within Haleakala National Park.

ISLAND OF MAUI'S PLANTS: UPDATED JANUARY 23, 1997

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		Status				
		Status	No. of pops	No. of plants	Maui	found on other islands
Phlegmariurus mannii (listed as *Lycopodium mannii*)	Wawae'iole	E	3	<300	✓	✓ *
Phyllostegia mannii	No common name	E	1	<10	✓°	✓
Phyllostegia mollis	No common name	E	4	50-100	✓	✓
Phyllostegia parviflora var. *parviflora*	No common name	E	1	4	✓°	✓
Plantago princeps var. *laxiflora*	Ale	E	7	100	✓	✓ *
Plectocirsera holochila	No common name	E	5	<40	✓	✓ *
Pteris lidgatei	No common name	E	2	34	✓	✓
Remya mauiensis	No common name	E	2	9	✓	
Sanicula purpurea	No common name	E	4	125-200	✓	✓
Santalum freycinetianum var. *lanaiense*	'Iliahi; sandalwood	E	7	>100	✓	✓
Scaevola coriacea	Dwarf naupaka	E	4	<300	✓	✓
Schiedea haleakalensis	No common name	E	3	100-200	✓	*
Schiedea hookeri	No common name	E	11	220-400	✓°	✓
Sesbania tomentosa	'Ohai	E	10	2,120-3,120	✓	✓
Solanum incompletum	Popolo ku mai	E	0	0	✓°	✓ *
Spermolepis hawaiiensis	No common name	E	6	1,000-3,000	✓	✓
Stenogyne angustifolia	No common name	E	7	>50,000	✓°	✓
Tetramolopium arenarium ssp. *arenarium*	No common name	E	1	125	✓°	✓
Tetramolopium arenarium ssp. *laxum*	No common name	E	0	0	✓°	
Tetramolopium capillare	No common name	E	4	130-150	✓	
Tetramolopium remyi	No common name	E	1	1	✓°	✓
Viola c-wahuensis	No common name	E	7	<100	✓	✓
Zanthoxylum hawaiiense	A'e	E	11	166	✓	✓
CANDIDATE PLANTS						
Cyanea copelandii ssp. *haleakalensis*	Haha	C	2	235	✓	*
Cyanea glabra	Haha	C	2	212	✓	*
Cyanea hamatiflora ssp. *hamatiflora*	Haha	C	10-12	70-125	✓	*
Dubautia plantaginea ssp. *humilis*	Na'ena'e	C	2	<300	✓	
SPECIES OF CONCERN						
Recommended as Candidates						
Bidens campylotheca ssp. *pentamera*	Ko'oko'olau	SOC	10	500	✓	*
Bidens campylotheca ssp. *waihoensis*	Ko'oko'olau	SOC	1	200	✓	
Bidens conjuncta	Ko'oko'olau	SOC	5	300+	✓	
Calamagrostis expansa	No common name	SOC	1	about 500	✓	✓ *
Calamagrostis hillebrandii	No common name	SOC	3	several 100	✓	✓
Canavalia pubescens	'Awikiwiki	SOC	7	7	✓	✓
Clermontia samuelii ssp. *hanaensis*	'Oha wai	SOC	several	<300	✓	
Clermontia samuelii ssp. *samuelii*	'Oha wai	SOC	5-10	50-100	✓	*
Cyanea asplenifolia	'Oha wai	SOC	3	230	✓	
Cyanea kunthiana	Haha	SOC	20+	200-500	✓	*
Cyanea obtusa	Haha	SOC	1	4	✓	
Cyrtandra filipes	Ha'iwale	SOC	1-2	20-100	✓	✓
Cyrtandra asybapha	Ha'iwale	SOC	1	200	✓	
Festuca hawaiiensis	No common name	SOC	2	<500	✓°	✓
Gardenia remyi	Nanu	SOC	7	<1,500	✓	✓
Geranium hanaense	Nohoanu	SOC	2	500-700	✓	*
Geranium hamatum	Nohoanu	SOC	7	500	✓	

* Denotes species found within Haleakala National Park.

ISLAND OF MAUI'S PLANTS: UPDATED JANUARY 23, 1997

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		Status				
		Status	No. of pops	No. of plants	Maui	found on other islands
Joinvillea ascendens ssp. ascendens	'Ohe	SOC	50-100	100-200	✓	✓ *
Microlepia mauiensis	No common name	SOC	3	100-200	✓	✓
Myrsine vaccinioides	Kolea	SOC	?	few 100	✓	
Nothocestrum latifolium	'Aiea	SOC	12	<300	✓	✓
Ochrosia haleakalae	Holei	SOC	2	3	✓	✓
Peperomia subpetiolata	'Ala'ala wai nui	SOC	?	100	✓	
Phlegmarhurus stemmermaniae	Wawae'iole	SOC	4	<20	✓	✓
Phyllostegia bracteata	No common name	SOC	2	<1007	✓	
Pritchardia forbesiana	Loulu	SOC	5+	<100	✓	
Ranunculus hawaiensis	Makou	SOC	5	<300	✓	✓ *
Ranunculus mauiensis	Makou	SOC		<60	✓	✓ *
Schiedea pubescens var. pubescens	No common name	SOC	3	10-50	✓	✓
Schiedea salicaria	No common name	SOC	several	100-300	✓	
Solanum nelsonii	Popolo	SOC	8	<3,000	✓*	✓
Thelypteris boydiae	No common name	SOC	3	250-300	✓	✓
Other Species of Concern						
Acacia koaia	Koai'e	SOC	many	>1,000	✓	✓
Argyroxiphium virescens	Greensword	SOC	0	17	✓*^	*
Asplenium leucostegioides	No common name	SOC	0	0	✓*	
Asplenium schizophyllum	No common name	SOC	many	500-3,000	✓	✓ *
Bidens mauiensis	Ko'oko'olau	SOC	several	few 1,000	✓	✓
Bobea timonioides	'Ahakea	SOC	10	400-500	✓	✓
Botrychium robustum	No common name	SOC	100	200	✓*	✓
Copporis sandwichiana	Pua pilo	SOC	1	> 100	✓	✓
Chamaesyce celastroides var. kaohiensis	'Akoko	SOC	5	few 100	✓	✓
Chamaesyce olowalana	'Akoko	SOC	7	10,000+	✓	✓
Chamaesyce skottsbergii var. vaccinioides	'Akoko	SOC	7	few 1,000	✓*	✓
Cheirodendron spencerii ssp. nov.	Honohino	SOC	0	0	✓*	✓
Clermontia grandiflora ssp. maxima	'Oha wai	SOC	0	0	✓*	
Clermontia multiflora	'Oha wai	SOC	0	0	✓*	✓
Clermontia tuberculata	'Oha wai	SOC	6	?	✓	*
Cyanea arborea	Haha	SOC	0	0	✓*	
Cyanea comata	Haha	SOC	0	0	✓*	
Cyanea grimesiana ssp. cylindrocalyx	Haha	SOC	0	0	✓*	
Cyanea horrida	Haha	SOC	10	?	✓	
Cyanea longissima	Haha	SOC	0	0	✓*	
Cyanea pohaku	Haha	SOC	0	0	✓*	*
Cyanea quercifolia	Haha	SOC	0	0	✓*	
Cyanea solanacea	Haha	SOC	3	<1,000	✓?	✓
Cyrtandra biserrata	Ha'iwale	SOC	?	?	✓	✓
Cyrtandra halewensis	Ha'iwale	SOC	?	?	✓	✓
Cyrtandra hydeoni	Ha'iwale	SOC	3	?	✓	✓
Dissochondrus biflorus	No common name	SOC	13	1,000s	✓	✓
Dryopteris wimpleneana	No common name	SOC	3	>500	✓	
Dubautia platyphylla	Na'ena'e	SOC	several	100s	✓	*
Embelia pacifica	Kilioe	SOC	?	?	✓	✓ *
Eragrostis deflexa	No common name	SOC	30	>3,000	✓?	✓
Eragrostis mauiensis	No common name	SOC	0	0	✓*	✓ *

* Denotes species found within Haleakala National Park.

ISLAND OF MAUI'S PLANTS: UPDATED JANUARY 23, 1997

LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT.

Species status by island: E= endangered; T= threatened; P= formally proposed as E or T; C= candidate for listing R=recommended for listing (L) as E or T, or for candidacy (C); SOC= species of concern; *=possibly extinct in the wild; ^=in cultivation; (CH)=critical habitat declared. ‡=N.W. Hawaiian Islands: Fr. Frigate, Kure; Laysan, Midway, Necker, Nihoa, Pearl & Hermes.

		Status				
		Status	No. of pops	No. of plants	Maui	found on other islands
Eurya sandwicensis	Anini	SOC	?	100s-1,000s	✓	✓
Exocarpos gaudichaudii	Heau	SOC	?	Sev. 100	✓	✓
Haplostachys linearifolia	No common name	SOC	0	0	✓*	✓
Haplostachys truncata	No common name	SOC	0	0	✓*	
Hedyotis elatior	No common name	SOC	?	>5,000	✓	✓
Hedyotis foliosa	No common name	SOC	0	0	✓*	
Hedyotis formosa	No common name	SOC	?	?	✓	
Hedyotis littoralis	No common name	SOC	?	?	✓	✓
Hibiscadelphus wilderianus	Hau kuahiwi	SOC	0	0	✓*	
Hibiscus kokio ssp. kokio	Koki'o 'ula'ula	SOC	?	100s	✓	✓
Hillebrandia sandwicensis	Pu'a maka nui	SOC	?	1,000s	✓	✓ *
Isoetes hawaiiensis	Quillwort	SOC	2	100,000	✓	✓
Lagenifera mariensis	Howsiaula	SOC	10	<3,000	✓	✓ *
Lepidium bidentatum var. o-wahiense	'Anaunau	SOC	?	>2,000	✓	✓
Lindsaea repens var. macraeana	No common name	SOC	20-50	?	✓	✓
Lobelia hypoleuca	No common name	SOC	?	1,000s	✓	✓ *
Mariscus hualalaiensis	No common name	SOC	0	0	✓*	
Melicope haleakalae	Alani	SOC	?	?	✓	*
Melicope hawaiensis	Mokihana kuhae moa	SOC	?	?	✓	✓ *
Melicope obovata	Alani	SOC	0	0	✓*	✓
Morinda trimera	Noni kuahiwi	SOC	?	<1,000	✓	✓
Mucuna sloanei var. persericea	No common name	SOC	3	?	✓	
Neraudia melastomifolia	Ma'aloa	SOC	?	1,000s	✓	✓
Nesohedyotis polycladia	Kenhi	SOC	?	<5007	✓	✓
Phyllostegia hillebrandii	No common name	SOC	0	0	✓*	
Phyllostegia immaculata	No common name	SOC	0	0	✓	✓
Phyllostegia rockii	No common name	SOC	0	0	✓*	
Physalis sandwicensis	Popolo ku mai	SOC	?	?	✓	✓
Pittosporum argentifolium	Ho'awa	SOC	?	?	✓	✓
Portulaca molokiniensis	'Ihi	SOC	?	>500	✓	✓
Portulaca villosa	'Ihi	SOC	?	?	✓	✓
Pritchardia glabrata	Loulu	SOC	1	<1,000	✓	
Rubus macraei	'Akala	SOC	?	<500?	✓	✓ *
Sanicula sandwicensis	No common name	SOC	1	?	✓	✓ *
Scaevola sp. nov. (hobdy1)	Naupaka	SOC	0	0	✓*	
Schiedea diffusa	No common name	SOC	11	<3,000	✓	✓
Schiedea emphesa	No common name	SOC	0	0	✓*	*
Schiedea menziesii	No common name	SOC	?	>5,000	✓	✓
Sicyos cucumerinus	'Anunu	SOC	?	?	✓	✓ *
Sicyos hillebrandii	'Anunu	SOC	0	0	✓*	
Silene cryptopetala	No common name	SOC	0	0	✓*	*
Silene degeneri	No common name	SOC	0	0	✓*	*
Stenogyne cinerea	No common name	SOC	0	0	✓*	
Stenogyne kealiakalae	No common name	SOC	0	0	✓*	*
Stenogyne viridis	No common name	SOC	0	0	✓*	
Strebhus pendulinus	No common name	SOC	?	?	✓	✓ *
Strongylodon ruber	No common name	SOC	?	?	✓	✓ *
Tetramolopium conyzoides	No common name	SOC	0	0	✓*	✓
Tetramolopium lepidotum ssp. arbuscula	No common name	SOC	0	0	✓*	*

* Denotes species found within Haleakala National Park.

ISLAND OF MAUI'S PLANTS: UPDATED JANUARY 23, 1997

LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT.

Species status by island: E= endangered; T= threatened; P= formally proposed as E or T; C= candidate for listing R=recommended for listing (L) as E or T, or for candidacy (C); SOC= species of concern; *=possibly extinct in the wild; °=in cultivation; (CH)=critical habitat declared. ‡=N.W. Hawaiian Islands: Fr. Frigate, Kure; Laysan, Midway, Necker, Nihoa, Pearl & Hermes.

		Status				
		Status	No. of pops	No. of plants	Maui	found on other islands
Tetraplasandra oahuensis	'Ohe'ohe	SOC	many	>1,000	✓	✓ *
Torulinkam odoratum ssp. *auriculatum*	No common name	SOC	0	0	✓°	✓
Wikstroemia bicornata (missp. *Wikstroemia* in FR)	'Akia	SOC	?	1,000±	✓	✓
Wikstroemia villosa	'Akia	SOC	?	?	✓°	

* Denotes species found within Haleakala National Park.

TABLE 4-2

ISLAND OF MAUI'S ANIMALS: UPDATED JANUARY 23, 1997

LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT

Species status by island: E=endangered; T=threatened; P=formally proposed as E or T; C=candidate for listing; R=recommended for listing (L) as E or T, or for candidacy (C); SOC=species of concern; *=possibly extinct; #=extremely rare; (CH)=critical Habitat designated.

		STATUS	Maui	found on other islands
VERTEBRATES (Statewide: 36 Endangered + 4 Threatened + 4 C + 5 ✓ = 49 taxa; 1 RL)				
LISTED MAMMALS				
Lasiurus cinereus semotus	Bat, Hawaiian hoary; 'Ope'ape'a	E	✓	✓ *
Monachus schauinslandi (CH)	Hawaiian monk seal; 'Ilio-holo-i-ka-uaua	E	✓	✓
LISTED BIRDS				
Anas wyvilliana	Duck, Hawaiian; Koloa maoli	E	✓*	✓
Branta (=Nesochen) sandvicensis	Goose, Hawaiian; Nene	E	✓	✓ *
Fulica alai	Coot, Hawaiian; 'Alae ke'oke'o	E	✓	✓
Gallinula chloropus sandvicensis	Moorhen, Common; Hawaiian gallinule; 'Alae 'ula	E	✓*	✓
Himantopus leucocephalus knudseni	Nuku pu'u, Maui	E	✓*	*
Himantopus mexicanus knudseni	Stilt, Black-necked; Hawaiian stilt; Ae'o	E	✓	✓
Loxops coccineus ochraceus	'Akepa, Maui; 'Akepa'ie	E	✓*	*
Melamprosops phaeosoma	Po'ouli	E	✓#	
Palmeria dolei	Honeycreeper, Crested; 'Akohekohe	E	✓	*
Pseudonestor xanthophrys	Parrotbill, Maui	E	✓	*
Pterodroma phaeopygia sandwichensis	Petrel, Dark-rumped; Hawaiian petrel; 'Ua'u	E	✓	✓ *
SPECIES OF CONCERN: BIRDS				
Asio flammeus sandwichensis	Owl, Hawaiian short-eared; Pueo	SOC	✓	✓ *
Moho bishopi	'Ō'ō, Bishop's	SOC	?; ✓*	✓
Oceanodroma castro cryptoleucura	Storm petrel, Band-rumped	SOC	✓	✓
LISTED REPTILES				
Caretta caretta	Turtle, Loggerhead sea; (incidental in Hawai'i)	T	✓	✓
Chelonia mydas	Turtle, Green sea; Honu	T	✓	✓
Dermochelys coriacea	Turtle, Leatherback sea; (incidental in Hawai'i)	E	✓	✓
Eretmochelys imbricata	Turtle, Hawksbill; 'Ea	E	✓	✓
Lepidochelys olivacea	Turtle, Olive ridley sea; (incidental in Hawai'i)	T	✓	✓
SPECIES OF CONCERN: FISHES				
Lentipes concolor	O'opu alamo'o	SOC	✓	✓ *
INVERTEBRATES (Statewide: 41 Endangered + 26 C + 356 SOC = 424 taxa; 9 RC, 24 RL)				
SPECIES OF CONCERN: SNAILS				
Newcombia cumingi	Snail, Newcomb's tree	SOC	✓	
Neritilia hawaiiensis	Snail, anchialine pond	SOC	✓	✓
Partulina anceryana	Snail, Maui tree; Pīpō kani oe	SOC	✓	
Partulina carnicolor	Snail, Maui tree; Pīpō kani oe	SOC	✓	
Partulina crocea	Snail, Maui tree; Pīpō kani oe	SOC	✓	
Partulina dolei	Snail, Maui tree; Pupu kani oe	SOC	✓	*
Partulina fusoides	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina germana	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina goulді	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina grisea	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina indusa	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina konana	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina lemnoni	Snail, Maui tree; Pupu kani oe	SOC	✓	

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ISLAND OF MAUI'S ANIMALS: UPDATED JANUARY 23, 1997

LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT

Species status by island: E=endangered; T=threatened; P=formally proposed as E or T; C=candidate for listing; R=recommended for listing (L) as E or T, or for candidacy (C); SOC=species of concern; *=possibly extinct; #=extremely rare; (CH)=critical Habitat designated.

		STATUS	Maui	found on other islands
Partulina marmorata	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina mustabilis	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina nanni	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina nivea	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina perdix	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina plumbea	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina porcellana	Snail, Maui tree; Pupu kani oe	SOC	✓	*
Partulina radiata	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina splendida	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina tappaniana	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina terebra	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina thaumaiona	Snail, Maui tree; Pupu kani oe	SOC	✓	
Partulina utulata	Snail, Maui tree; Pīpō kani oe	SOC	✓	
Partulina winniei	Snail, Maui tree; Pīpō kani oe	SOC	✓	
Perdicella corinella	Snail (No common name)	SOC	✓	*
Perdicella fulguratx	Snail (No common name)	SOC	✓	
Perdicella kahuai	Snail (No common name)	SOC	✓	
Perdicella maximsis	Snail (No common name)	SOC	✓	
Perdicella ornata	Snail (No common name)	SOC	✓	
Perdicella thwingi	Snail (No common name)	SOC	✓	
Perdicella zebra	Snail (No common name)	SOC	✓	
Perdicella zebrina	Snail (No common name)	SOC	✓	
CANDIDATE ARTHROPODS				
DRAGONFLIES AND DAMSELFLIES (Order Odonata)				
Megalagrion nesiotes	Damselfly, Nesiotes megalagrion	C	✓(RL)	✓
Megalagrion pacificum	Damselfly, Pacific megalagrion	C	✓(RL)	✓ *
Megalagrion xanthomelas	Damselfly, orangeblack megalagrion	C	✓(RL)	✓
FLIES (Order Diptera)				
Drosophila neoclavisetae	Pomace fly, Maui	C	✓(RL)	
BUTTERFLIES AND MOTHS (Order Lepidoptera)				
Manduca blackburni	Moth, Blackburn's sphinx	C	✓*	✓
SPECIES OF CONCERN: ARTHROPODS				
ROCKHOPPERS AND BRISTLETAILS (Order Archeognatha)				
Neomachilis (=Machiloides) heteropus	Bristletail, Hawaiian long-palp	SOC	✓	✓
DRAGONFLIES AND DAMSELFLIES (Order Odonata)				
Megalagrion nigrohamatum	Damselfly, nigrohamatum megalagrion	SOC	✓	✓
GRASSHOPPERS AND ALLIES (Order Orthoptera)				
Caconemobius howarthi	Cave cricket, Howarth's	SOC	✓	
TRUE BUGS (Order Hemiptera)				
Colpocrichus blackburniae	Koa bug	SOC	✓	✓
Ithamar annectans	Rhopalid bug, annectans	SOC	✓	✓
Ithamar hawaiiensis	Rhopalid bug, Hawaiian	SOC	✓	✓

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ISLAND OF MAUI'S ANIMALS: UPDATED JANUARY 23, 1997
LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT

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		STATUS	Maui	found on other islands
Neteis haleakalae	Seed bug, Mt. Haleakala	SOC	✓	*
Nesocryptias villosa	Seed bug, villosan flightless	SOC	✓	✓
Solcella smithi	Redwood, Smith's sacellan	SOC	✓	
CICADAS AND ALLIES (Order Homoptera)				
Nesosydne acuta	Planthopper, Iao Valley nesosydne	SOC	✓	
Nesosydne bridwelli	Planthopper, Bridwell's nesosydne	SOC	✓	
Nesosydne cyrtandrae	Planthopper, Nahiku nesosydne	SOC	✓	
Nesosydne longipes	Planthopper, long-footed nesosydne	SOC	✓	
Nesosydne vulcana	Planthopper, Kerame nesosydne	SOC	✓	
Oliarus priola	Planthopper, priolan oliarus	SOC	✓	
LACEWINGS AND ALLIES (Order Neuroptera)				
Distoleon (=Edoleon) perjurus	Antlion, Moloka'i	SOC	✓	✓
Micromus (=Nesochrysma) haleakalae	Brown lacewing, Haleakala	SOC	✓	
Micromus (=Pseudospectra) cookeorum	Brown lacewing, Cooke's	SOC	✓	
Micromus (=Pseudospectra) lobipennis	Brown lacewing, Lobe-wing	SOC	✓	
BEETLES (Order Coleoptera)				
Deropristus deroderus	Ground beetle, Haleakala deropristus	SOC	✓	
Eopenthes polinus	Click beetle, Polinus eopenthes	SOC	✓	
Nesotocus giffardi	Weevil, Giffard's nesotocus	SOC	✓	✓
Nesotocus munroi	Weevil, Munro's nesotocus	SOC	✓	✓
Pentarthrum obscurum	Weevil, obscure pentarthrum	SOC	✓	✓
Plagithmysus alani	Long-horned beetle, Maui alani	SOC	✓	
Plagithmysus dubautlanus	Long-horned beetle, Maui dubautia	SOC	✓	
Plagithmysus forbesi	Long-horned beetle, Forbes' Maui	SOC	✓	
Plagithmysus Lose	Long-horned beetle, Maui koa	SOC	✓	
Plagithmysus laticollis	Long-horned beetle, Maui wide-necked	SOC	✓	✓
Plagithmysus longicollis	Long-horned beetle, Long-necked	SOC	✓	
Plagithmysus pipericola	Long-horned beetle, Maui wamuki	SOC	✓	✓
Plagithmysus pubiliarus	Long-horned beetle, 'Ohi'a	SOC	✓	
Plagithmysus rubi	Long-horned beetle, Maui 'akala	SOC	✓	✓
Plagithmysus similimus	Long-horned beetle, Maui similar	SOC	✓	
Plagithmysus speculifer	Long-horned beetle, Maui speculifer	SOC	✓	✓
Plagithmysus swezeyanus	Long-horned beetle, Ahuruhuru	SOC	✓	✓
Plagithmysus swezeyi	Long-horned beetle, Swezey's	SOC	✓	
Plagithmysus sylvai	Long-horned beetle, Maui forest	SOC	✓	✓ *
Proterhinus 72 spp.	Proterhinid beetles, Hawaiian	SOC	✓*	*
Pseudobroscus lewisi	Ground beetle, Haleakala pseudobroscus	SOC	✓	
Rhyncogonus lobainae	Weevil, Lobaina rhyncogonus	SOC	✓	
BUTTERFLIES AND MOTHS (Order Lepidoptera)				
Agrotis crassata	Moth, Crassata agrotis noctuid	SOC	✓*	✓*
Helicoverpa confusa	Moth, confused helicoverpan noctuid	SOC	✓*	✓*
Omiodes (=Hedylepta) monogona	Moth, Hawaiian bean leafroller	SOC	✓*	✓*
Omiodes (=Hedylepta) musicola	Moth, Maui banana omiodes	SOC	✓	✓
Stenorrhages (=Margaronia) exsula	Moth, green stenorrhages	SOC	✓	*
Thyrocopa apatela	Moth, Haleakala flightless thyrocopa	SOC	✓	

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ISLAND OF MAUI'S ANIMALS: UPDATED JANUARY 23, 1997
LISTED AND CANDIDATE SPECIES, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT

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		STATUS	Maui	found on other islands
Udea (=Orebia) dryadopa	Moth, 'Ohenapaka udean	SOC	✓	✓
ANTS, BEES AND WASPS (Order Hymenoptera)				
Externius haleakalae	Wasp, Haleakala externius sphecid	SOC	✓	
Hylaeus (=Nesoprosopis) anthracina	Bee, anthracinan yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) assimulans	Bee, assimulans yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) comes	Bee, comes yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) difficilis	Bee, difficult yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) facilis	Bee, easy yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) haleakalae	Bee, Haleakala yellow-faced	SOC	✓*	
Hylaeus (=Nesoprosopis) longiceps	Bee, longhead yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) satellus	Bee, satellus yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) vicina	Bee, vicinan yellow-faced	SOC	✓*	✓*
Hylaeus (=Nesoprosopis) volantis	Bee, volantic yellow-faced	SOC	✓*	✓*
Odynerus nigripennis	Wasp, Black-winged odynerus vespid	SOC	✓	✓
SHRIMP (Order Decapoda)				
Antecaridina lauensis	Shrimp, no common name	SOC	✓	✓
Calliasmata pholidota	Shrimp, no common name	SOC	✓	✓
Metabetaeus lohena	Shrimp, no common name	SOC	✓	✓
Palaemonella burnsi	Shrimp, no common name	SOC	✓	✓
Procaris hawaiana	Shrimp, no common name	SOC	✓	✓

TABLE 4-3

ENDANGERED AND THREATENED ANIMALS OF HAWAII
(Updated January 1995)

Key
E -- Endangered. In addition to the permit required by the State, species that are listed as endangered by the federal government require a special permit. These are available from the U.S. Fish and Wildlife Service.
T -Threatened. In addition to the permit required by the State, species that are listed as threatened by the federal government require a special permit. These are available from the U.S. Fish and Wildlife Service.
* -- These birds are listed on the Federal Migratory Bird Treaty Act and are listed as "migratory" by the USFWS.
O -- Oahu L -- Lanai Mo -- Molokai
H -- Hawaii K -- Kauai
M -- Maui N -- Niihau

Common Name	Scientific Name	Hawaiian Name	State Status	Federal Status	Known Breeding Range	Portions of Range Where Endangered or Threatened
Sea Birds:						
Petrel, Hawaiian	*Pterodroma phaeopygia sandwichensis*	'Ua'u	E	E	H, M, L	Entire
Shearwater, Newell's	*Puffinus auricularis newelli*	'A'o	T	T	H, Mo, K	Entire
Storm-Petrel, Band-rumped	*Oceanodroma castro cryptoleucura*	'Oe'Oe	E	-*	K	Entire
Tern, White	*Gygis alba rothschildi*	Manu-O-Ku	E	-*	O, Leeward	O
Water Birds:						
Coot, Hawaiian	*Fulica americana alai*	'Alae-ke'oke'o	E	E*	H, M, Mo	Entire
Duck, Hawaiian	*Anas wyvilliana*	Koloa-maoli	E	E*	H, O, K, N	Entire
Duck, Laysan	*Anas laysanensis*	-	E	E*	Laysan Isl.	Entire
Gallinule, Hawaiian	*Gallinula choloropus sandvicensis*	'Alae'ula	E	E*	O, K	Entire
Goose, Hawaiian	*Nesochen sandvicensis*	Nene	E	E*	H, M	Entire
Shore Birds:						
Stilt, Hawaiian	*Himantopus mexicanus knudseni*	'Ae'o	E	E*	H, M, Mo, O, K, N	Entire
Birds of Prey:						
Hawk, Hawaiian	*Buteo solitarius*	'Io	E	E*	H	Entire
Owl, Hawaiian	*Asio flammeus sandwichensis*	Pueo	E	-*	H, M, Mo, L O K N	O

Forest Birds:						
'Akepa, Hawaii	*Loxops coccineus coccineus*	'Akepeu'le	E	E	H	Entire
'Akepa, Maui	*Loxops coccineus ochraceus*	'Akepeu'le	E	E	M	Entire
'Akialoa, Kauai	*Hemignathus procerus*	'Akialoa	E	E	K	Entire
'Akiapola'au,	*Hemignathus munroi*	'Akiapola'au	E	E	H	Entire
'Amakihi, Maui	*Hemignathus virens wilsoni*	'Amakihi	E	-	M, Mo, L	L
'I'iwi,	*Vestiaria coccinea*	'I'iwi	E	-	K, M, Mo, O, L, H	O, L, Mo
Creeper, Hawaii	*Oreomystis mana*	-	E	E	H	Entire
Creeper, Molokai	*Paroreomyza flammea*	Kakawahie	E	E	Mo	Entire
Creeper, Oahu	*Paroreomyza maculata*	'Alauwahio	E	E	O	Entire
Crow, Hawaiian	*Corvus hawaiiensis*	'Alala	E	E*	H	Entire
Finch, Laysan	*Telespyza cantans*	-	E	E	Laysan Isl.	Entire
Finch, Nihoa	*Telespyza ultima*	-	E	E	Nihoa Isl.	Entire
Honeycreeper, Crested	*Palmeria dolei*	'Akohekohe	E	E	M	Entire
Millerbird, Nihoa	*Acrocephalus familiaris kingi*	-	E	E	Nihoa Isl.	Entire
Nuku-pu'u, Kauai	*Hemignathus lucidus hanapepe*	Nuku-pu'u	E	E	K	Entire
Nuku-pu'u, Maui	*Hemignathus lucidus affinus*	Nuku-pu'u	E	E	M	Entire
'O'o, Kauai	*Moho braccatus*	'O'o'a'a	E	E	K	Entire
'O'u	*Psittirostra psittacea*	'O'u	E	E	H, K	Entire
Parrotbill, Maui	*Pseudonestor xanthophrys*	-	E	E	M	Entire
Palila	*Loxioides bailleui*	Palila	E	E	H	Entire
Po'ouli	*Melamprosops phaeosoma*	-	E	E	M	Entire
Thrush, Kauai	*Myadestes myadestinus*	Kama'o	E	E	K	Entire
Thrush, Molokai	*Myadestes lanaiensis rutha*	Oloma'o	E	E	Mo	Entire
Thrush, Small Kauai	*Myadestes palmeri* (Listed as *Phaeornis palmeri* in the Migratory Bird Treaty Act.)	Puaiohi	E	E*	K	Entire
Mammals:						
Bat, Hawaiian	*Lasiurus cinereus semotus*	'Ope'ape'a	E	E	H, K, M	Entire
Seal, Hawaiian	*Monachus schauinslandi*	'Ilio-holo'i-kauaua	E	E	Leeward Isls.	Entire
Whale, Bowhead	*Balaena mysticetus*	-	E	E	Oceanic	Entire
Whale, Finback	*Balaenoptera physalus*	-	E	E	Oceanic	Entire
Whale, Gray	*Eschrichtius robustus*	-	E	E	Oceanic	Entire
Whale, Humpback	*Megaptera novaeangliae*	-	E	E	Oceanic	Entire
Whale, Sei	*Balaenoptera borealis*	-	E	E	Oceanic	Entire
Whale, Sperm	*hyseter catodon*	-	E	E	Oceanic	Entire

Reptiles:

Turtle, Pacific Green Sea	*Chelonia mydas agassizi*	Honu	T	T	Oceanic	Entire
Turtle, Pacific Hawksbill	*Eretmochelys imbricata bissa*	Ea	E	E	Oceanic	Entire
Turtle, Pacific Leatherback Sea	*Dermochelys coriacea schelegelii*	-	E	E	Oceanic	Entire
Turtle, Loggerhead Sea	*Caretta caretta*	-	T	T	Oceanic	Entire
Turtle, Olive Ridley Sea	*Lepdochlys olivacea*	-	T	T	Oceanic	Entire

Mollusks:

Snail, Oahu Tree	*Achatinella sp.*	pupu kanloe	E	E	O	Entire

SECTION 5
DETERMINATION OF ALIEN SPECIES

5.1 INTRODUCTION

At present, there are over 2,500 alien arthropod species of insects and about 75+ alien non-marine mollusks established in the wild in Hawaii (Howarth 1985). It is estimated (CGAPS 1996) that, each year, approximately 20 to 30 new alien insects make their way to Hawaii and become established. Annually, about three of these species turn out to be economic pests (OTA 1993). During 1994, State and Federal inspectors intercepted alien insects and other invertebrates at airports and harbors 2,275 times. Of these, 16 percent were found in ship cargo, 39 percent in air cargo, 40 percent in baggage from passenger flights, and 5 percent in mailed parcels and other miscellaneous pathways. About 48 percent originated in foreign countries and 52 percent were sent to Hawaii from the mainland U.S. (CGAPS 1996). These surveys indicate marked differences from the perceptions of agriculture inspectors as shown in Section 1, Table 1-5. The agricultural industry estimates it is losing $300 million per year in revenue from potential markets that now refuse Hawaii exports because of alien fruit flies that infest many crops (CGAPS 1996).

The loss to protected plant species is not quantifiable in terms of dollars, but is of ecological concern. This concern is not only with the potential effects of alien insect species native and protected plants, but can also be translated to the visitor industry from the standpoint of potentially degrading "Hawaii" as a unique visitor destination, thereby threatening the number one industry in Hawaii. The following describes which alien species taxa might be inadvertently introduced into Hawaii. [Note: the majority of the remainder of this section has been prepared by Dr. Frank G. Howarth. The full text of Dr. Howarth's information is included in Appendix E.]

The introduction of alien species is the greatest single threat to the conservation of native species and to the integrity of Haleakala National Park and other natural areas on Maui (Brockie *et al.* 1988). The impacts caused by alien species are the most important factor in population declines, endangerment, and extinctions of native organisms in Hawaii (CGAPS 1996; Holt 1996). Furthermore, alien species can undo all other conservation programs. Alien species are also a major impediment to agricultural and economic development (including tourism) in Hawaii, causing hundreds of millions of dollars damage to the economy each year (CGAPS 1996). Thus, there is an urgency to design and implement more effective inspection programs and other mitigative strategies to prevent new alien species from becoming established in Hawaii when designing and constructing new travel facilities (Holt 1996), such as the Proposed Project. However, improving alien species prevention procedures and mitigating the effects of alien species requires the ability to predict the origins, mode of travel, and identities of potential pests.

The remainder of this section addresses the following questions: What taxonomic groups are involved? What common characteristics do they have that allow them to become

pests? And what are the important mechanisms by which they gain entry into Hawaii? A comprehensive analysis would be daunting as between 5,000 and 6,000 alien species already are established in the wild in Hawaii (Eldredge and Miller 1995; Miller and Eldredge 1996). Therefore, the following is a syntheses of the pertinent information, description of the general phenomena involved, and illustrations of relevant examples. The information that follows only covers terrestrial species because the risk of invasions of marine organisms result mainly from shipping, not aircraft. However, many marine organisms may enter Hawaii as purposeful introductions (including smuggling) on aircraft. Even the water used to carry marine organisms for food consumption (*e.g.*, shrimp, lobsters, and fish), for aquaria and other uses may contain undesirable alien micro-organisms (Carlton 1996).

The environmental problems posed by invasive alien species is global, and the quest for solutions is becoming more urgent and international in scope (Baskin 1996; Vitousek, *et al.* 1996). Recently, Norway hosted a United Nations Conference on Alien Species that called for global action to curb the increasing rate of unwanted species introductions worldwide (Baskin 1996; Schei 1996). Also in 1996, the U.S. Congress drafted a National Invasive Species Act that at present addresses invasions via ship ballast, but the prospects are likely that a more inclusive law governing other alien species will soon be passed. In early February 1997, U.S. Senator Daniel Akaka introduced legislation to clear up a confusing array of federal regulations controlling animals, plants, and diseases that attack vegetation in Hawaii (TenBruggencaate 1997).

5.2 INVASION ECOLOGY: HAWAII

Being more than 2,100 miles (3,500 kilometers) from the nearest comparable high island chain or continent, few organisms were able to disperse to and successfully colonize the islands naturally. Since islands appear to have existed continuously since Kure formed about 29 million years ago (Carson and Clague 1995), and since the endemic biota evolved from about a 1,000 original colonists (Mueller-Dombois, *et al.* 1981), then on average a new group successfully colonized Hawaii about once each 50,000 years. Of course, some indigenous (non-endemic native species) organisms arrive much more frequently (*e.g.*, migratory birds). Even so, the Hawaiian biota evolved in splendid isolation, and some groups have evolved into many different closely related species, each able to exploit a different environment or niche. Humans have broken the isolation of Hawaii, and over 5,000 alien species are now thought to be established in the wild (Eldredge and Miller 1995). There has been much speculation about the reasons for this invasion and the apparent vulnerability of the native Hawaiian biota. Some of this speculation remains unsupported, but it is useful to review the pertinent evidence to better understand past invasions as well as make predictions about the effects of new invasions.

First, the apparent vulnerability of Hawaii to the impacts of invasions can best be understood within the concept of novel perturbations (Howarth and Ramsay 1991). Evolutionary theory predicts that species are admirably adapted to their environment, even taking advantage of natural disturbances to gain new ground or as cues to synchronize their life cycles. For example, fire climax communities require periodic fires to maintain themselves, and flood plain communities require periodic inundation. Severe environmental

impacts result from the effects of novel perturbations; *i.e.*, disturbances for which the community has had at most rare previous experience. To recognize the novelty, a disturbance should be envisioned as it affects the biotic community, not as it affects human interests or assumptions. For example, a minor flood at the wrong time or absence of a flood at the correct time may affect a flood-adapted community far more seriously than an exceptionally severe flood at the correct time.

Because of its extreme isolation, many higher taxonomic groups (*e.g.*, reptiles, amphibians, ground-dwelling mammals, and many invertebrate groups) are not present in the native biota of Hawaii. When representatives of these groups arrived with human help, some created novel perturbations for native species. More importantly, many recent invaders are adapted to take advantage of novel human-caused disturbances, such as fire, land clearing, development of agro-ecosystems and urban habitats, and grazing by domesticated stock. A similar vulnerability is recognized in eastern North America where the vast majority of ruderal herbs are invaders from Europe, where they have had a long history of co-evolution in Western style agro-ecosystems (Niemelè and Mattson 1996).

5.3 CHARACTERISTICS OF COLONIZING SPECIES

An invasion is defined as the establishment, increase, and spread of an alien population that leads to its becoming a detrimental competitor in the new community. Invasiveness is not an intrinsic character of the invader, but results from the integration of the requirements and traits of the invader with the local biotic and abiotic factors in the new area. To become invasive, a colonizing population must only have an average rate of increase greater than one (1); that is, to continue to increase. This can be accomplished by having either a high reproductive potential or a low death rate. The most successful invaders often enjoy both strategies because they are able to exploit native new food sources in the absence of many of their competitors, diseases and predators.

The principal or most commonly shared characteristic among invaders worldwide is the opportunity to disperse to a new area. Once an opportunistic founding population arrives in a new area, both stochastic events and environmental factors determine whether it can successfully establish. Experience from purposeful introductions suggests that stochastic events are important, as many well-planned introductions fail to establish.

To establish a successful breeding population, a colonizing species must be pre-adapted genetically to exploit the resources in the new land. Potential hosts must be present in enough numbers and in the right developmental stage; nesting and roosting sites, reproductive cues, and other ecological requirements of the species must also be present; and climate, including properly cued seasonal changes, must fit the development of the colonizing species.

Because the chances of both sexes being introduced simultaneously are low and the vagaries of finding a mate in the new land are high, hermaphroditic and parthenogenetic species (*i.e.*, those able to reproduce asexually) have a much better chance of becoming established than do sexually-reproducing species (Howarth and Moore 1983). Indeed, a high

proportion of alien invertebrates in Hawaii can use one of the former types of reproductive strategies. It also follows that generalist species establish more easily than specialists, because the former, with their wider host or prey ranges, are more likely to find suitable food. The genetics related to colonizing ability and invasiveness are becoming better understood, and this understanding will lead directly to management, control and quarantine recommendations (Baskin 1996; Rejmçnek 1996).

Competition with already established species is important but not primary in determining whether a particular species establishes or not; that is, species packing (the number of species that can share or exploit a given habitat and resource) is a separate phenomenon from the establishment of a colonizing species. One of the outcomes of the Hawaii International Biological Program (IBP) studies was the realization that, as more species become established in a habitat, it becomes more probable that additional species will find a suitable niche; thus, the chance of an alien species being able to establish is directly proportional to the number of species already present rather than inversely proportional, as is usually assumed (Mueller-Dombois and Howarth 1981). However, in the absence of disturbance regimes favoring monospecific communities (*e.g.*, agriculture), the greater the number of species present the less likely a new arrival may be able to monopolize an area or resource.

A newly establishing species, however, often creates new niches within an ecosystem in that initially, it or its products may not be exploited by the resident species. In time, either some resident species will adapt to exploit the alien, or other aliens will arrive to exploit it (Conner, *et al.* 1980). This process is occurring in many lowland, human-disturbed habitats in Hawaii, wherein the establishment of alien species is enhanced by the disturbance caused by humans or by introduced organisms. Each new alien further improves the chances of colonization by yet additional species (Howarth 1985a).

All species that are able to survive in a new environment are potential invaders. There is often a long lag period between establishment and recognition that there is a problem (Crooks and Soulé 1996). This lag may be caused by simple slow population growth, so that it takes time for a population to reach a problematic size. Second, the lag may be related to the absence of appropriate associated species necessary for effective reproduction and spread; or to the absence of appropriate disturbance regimes, or the presence of detrimental disturbance regimes that when changed allow the population to increase; *e.g.*, fire or grazing. Third, the organism will improve its adaptation to the new environment with each generation; thus time is on the side of the invader (Crooks and Soulé 1996). Eventually even seemingly innocuous alien species may expand from low population size and become invasive. In hind-sight it is often possible to determine the change that allowed such species to better exploit the new environment, but we need a way to predict such phenomena before they occur.

The IBP studies found that, phenologically, Hawaii could be considered perpetual spring (Mueller-Dombois, *et al.* 1981); that is, temperate organisms arriving in Hawaii would find environmental conditions equivalent to spring or early summer conditions. For most organisms, such a climate and plant phenology regime would be close to the beginning of

their growth and reproductive stages, which would be the ideal time for them to establish. Many temperate species have escaped their winter diapause and adapted well to Hawaii and become invasive. Tropical species arriving in Hawaii, also find an equitable climate that fits their needs well.

5.4 CHANCE OF ESTABLISHMENT: MAUI VERSUS OAHU

Continued airport operations and the Proposed Project at Kahului Airport will certainly increase the risk of introductions of alien species into Hawaii from the mainland U.S. However, it is also true that organisms escaping at Honolulu International Airport (HIA) and subsequently establishing on Oahu have a high probability of eventually dispersing to Maui and other Hawaiian islands, although the most serious invaders might be quarantined on Oahu to buy time to develop controls before they spread to other vulnerable islands. The chance of an alien species establishing and becoming invasive is better correlated with its opportunity for dispersal; that is to the volume of air traffic: number of flights, number of passengers, and amount and type of cargo from each of the source areas; rather than to the local environment at the two airports. Still it is useful to compare the relative risk at the two airports. Wind and available habitats are the two primary factors affecting the success rate of alien species becoming established at Honolulu and Kahului.

5.4.1 Wind

Many organisms, including most insects, some other invertebrates, many micro-organisms, and many plants, regularly disperse on wind currents; and a large percentage of the native biota originally were carried to Hawaii on the wind (Carlquist 1980). Many factors affect an organism's ability to disperse on the wind. For example, insects and other arthropods behaviorally avoid exposure to high winds, or disperse only at certain times of the day; and passively dispersing propagules may drop out of the air column only at convergent zones (that is, where two wind currents meet) or in eddy currents. Invading species may also take advantage of the wind to disperse; thus air currents near ports of entry can be important in determining the rate of establishment and spread of alien species, especially those arriving as stowaways or inadvertently.

Both the Kahului and Honolulu airports are windy environments that are dominated by the northeast trades, which blow about 90 percent of the time in summer and 50 percent in winter (Armstrong 1983). At HIA, the trades would carry dispersing organisms seaward or along the Ewa coast. During warm days a locally produced onshore breeze could offset the trades and prevent some dispersing aliens from being blown out to sea. At Kahului, the trades, which average slightly stronger than at HIA, would carry propagules towards the isthmus, and from there, the diurnal orographic wind could carry some organisms up Haleakala or the West Maui mountains.

Although it is difficult to quantify the level of risk caused by wind at Kahului Airport or to compare the relative risk of wind at Kahului with the risks at other airports, the

prevailing windy conditions at Kahului airport are important in the potential establishment and spread of invading alien species. Corroborating this assertion are the large numbers of insects and other waifs that are carried by the wind to the summit region of Haleakala during the day from lower-elevation slopes (Beardsley 1966). In fact, this wind-borne organic material supports an aeolian ecosystem there (Howarth 1987).

5.4.2 Habitats

Gagnè and Cuddihy (1990) recognized about 150 vegetation communities grouped into five altitudinal zones: coastal, lowland, montane, subalpine, and alpine. A comparison of the communities recorded on Maui and Oahu provides a rough approximation of the greater ecological diversity on Maui than on Oahu. The numbers are approximate: Oahu is better known, and some of its communities are subdivided more finely than similar communities on Maui; also certain alien communities are listed, and more of these occur on Oahu. However, as expected the coastal and lowland zones are approximately equal on the two islands. Sixty-six communities are listed for Oahu and 64 from Maui.

Maui is larger and higher, and upland communities are better represented there. Only three montane communities are recognized on Oahu, whereas 19 are found on Maui. There are no alpine and subalpine zones on Oahu and nine on Maui. Thus Maui is about 1/3 richer than Oahu (92 vs. 69) in vegetational communities.

Adding the community types not defined by vegetation (*e.g.*, cave, aquatic, aeolian), Maui would be even richer (*i.e.*, about 120 to 83), but these habitats have yet to be fully enumerated. If we include just the native communities, the ratio becomes close to 2/1. Including alien communities is valid for our purposes since it is a more inclusive measure of habitat diversity as well as the likelihood that an alien species will be able to become established. However, the probability that an alien will harm the natural environment including endangered species may relate more closely to number of native communities. As discussed above in "Invasion ecology," the greater the diversity of species and habitats, the greater probability that an alien species can find a suitable niche and establish in an area.

HIA is much larger than Kahului Airport and connected with Hickam Air Force Base runways. The greater amount of tarmac and concrete buildings would hinder establishment of some stowaways, but smuggled and purposeful entrants would leave the airport environs. Until recently, there also were sugar cane fields adjacent to the airport. Even now within the HIA environs there are wetlands, irrigated suburban and urban gardens and lawns, open spaces, golf courses, and abandoned fields. A great diversity of alien plants grow in the airport vicinity, including Japanese, Chinese and other ethnic gardens and horticultural plantings within the terminal area; all of these provide refuges and hideaways for arriving alien stowaways.

Urban areas are excellent areas for invasions, because of the similarity of environments among different cities and increased opportunity for introductions of urban aliens via human transport. Arriving organisms can find a familiar suitable environment in which to establish and from which to disperse and invade neighboring natural and

agricultural environments. Thus, the immediate area near HIA may be as hospitable as the environment at the Kahului Airport, but this would be difficult to quantify.

Funk (1994) lists 176 plant species occurring in six habitat types within the 1,447 acre Kahului Airport site; however, Kanaha Pond and surrounding areas within the airport environs were not surveyed. The dominant species recorded are alien or common native species that are known or would be expected to occur at HIA and other lowland airports in the islands. The source areas; that is, the environs, where the planes and propagules originate, are also usually within disturbed urban settings. Thus for stowaways and some purposefully imported organisms, the likelihood of establishment near the airport may be similar on both islands.

Even if the potential for establishment is equal for Oahu and Maui, opening Maui to more direct overseas flights doubles the potential area available for colonization. As a hypothetical example consider two baskets of mangoes each with the same two harmful aliens (species A and B) that are smuggled in from Southeast Asia. If both baskets arrive - Oahu, both pests may successfully establish or they may compete and only one may establish. Furthermore, evidence from purposeful introductions show that stochastic events play a major role in the initial phase of successful colonization. If one basket arrives on Oahu and the other on Maui, the stochastic and colonization events act separately, so that the chance of both establishing doubles; perhaps species A establishes on one island and species B on the other.

There is evidence that this phenomenon occurs in invasions in that different species first establish or first become problematic on different islands within Hawaii and subsequently spread to other islands. Adding the islands of Hawaii and Kauai will further compound this problem.

5.5 WHAT TAXONOMIC GROUPS HAVE BECOME PESTS IN HAWAII? AND WHAT CHARACTERS MAKE THEM PESTS?

5.5.1 Vertebrates: Mammals, Birds, Reptiles, Amphibians, and Fish.

Nearly all alien vertebrate species in Hawaii are pests in some situations, although some also have economic benefits (Stone 1985). The mammals are the best known and provide the best examples of the dilemma created by alien species introductions, especially the ungulates (hoofed animals), which have been the most destructive group on native ecosystems but are among the most important groups economically. Other herbivorous and frugivorous vertebrates are often important pests of agriculture as well as threats to native species.

The insectivorous and carnivorous species are potentially extremely detrimental to native animals. The impacts of many of the smaller species (especially the lizards) remain poorly documented, but the potential for harm is great as indicated by studies outside Hawaii (Cock 1985; Savage 1987; Schoener and Spiller 1987). Some more recently

introduced vertebrates have not yet reached their full distributional range in Hawaii, and their ultimate fate is unknown.

The reasons vertebrates are so destructive as a group results from their relatively large size (which requires more food and water reserves and wider environmental tolerances than smaller animals); they are also often more generalist feeders, more mobile, and thus more effective competitors than most invertebrates. On the other hand, an observational bias makes it easier for humans to recognize their impacts, especially for the larger species.

A few terrestrial vertebrates (especially the smaller ground and den-inhabiting species) can disperse as stowaways in cargo and aircraft, and aquatic species may arrive in ballast; but by far the most important avenue of dispersal into Hawaii among the vertebrates has been purposeful introductions for economic, recreational, or cultural purposes often by persons or groups unfamiliar with their potential negative consequences.

5.5.2 Snails - Mollusks

Relatively few mollusks, about 85 alien species, have been recorded in the wild in Hawaii. Of these about 40 are confirmed to be established, (Cowie 1997) and a large percentage of the latter are detrimental. A few (including the slugs, apple snails, and giant African snail) are agricultural pests (Cowie 1995). Some are important reservoirs of human and veterinary diseases, and some are important predators and herbivores of native species. The most notorious of the latter is the predatory rosy snail *Euglandina rosea* which is implicated in the extinction of many species of native snails (Hadfield, *et al.* 1993). Slugs threaten native plants and also are a food resource for harmful vertebrates in native habitats, thereby increasing the negative impacts of the latter (Gagnè 1983).

The reasons for their pest status results from their high reproductive potential and generalist food requirements. Successful invading species also require a good match of their needs with the local environment. Mollusks are slow moving and often conspicuous so that their role as the cause of the damage is often recognized. A few pestiferous mollusks arrived in Hawaii as stowaways, probably in shipments of fresh food or plant material, but most arrived as purposeful introductions for food consumption, biocontrol agents, aquaria, or for other purposes (Cowie 1997).

5.5.3 Insects

About 2,500 alien insect species are established in Hawaii (Nishida 1994). They are the largest group of unwanted adventive species, but the effects of most species on the Hawaiian environment are unknown. Some of the characters that make them damaging also make assessments difficult: small size, cryptic behavior, and high mobility. Risk also is related to their high fecundity and reproductive potential, low level of population control (*e.g.*, predators and diseases), and match of their requirements to the local environment. They also may adapt over time to new environments or hosts. Many of the most serious agricultural, urban, and environmental pests are invasive alien insect species. Their damage

to economic crops is well documented and indicative of their potential for damage to natural systems (CGAPS 1996) The most damaging groups include the following (Howarth 1985a):

- Social insects (*e.g.*, ants, wasps, bees, and termites) and colonial species (*e.g.*, scales, whiteflies, and aphids);
- Disease transmitters (*e.g.*, mosquitoes, bark beetles, and many Homoptera);
- Species with mutualistic relationships with other organisms (*e.g.*, pollinators, honeydew producers);
- Some generalists when the match to local environment is good and alternative hosts are abundant (*e.g.*, tachinids, parasitic wasps, and many plant-feeding species);
- Specialists when their host(s) are of economic, cultural, or aesthetic value (*e.g.*, some agricultural pests, endangered species pests, aesthetic plant pests, and veterinary pests); and
- Species that disrupt reproduction of valuable or native organisms or that favor the reproduction and spread of other harmful alien species.

Social predators are not present in the native fauna, and wherever aggressive ants and wasps are common, nearly all of the exposed, naive native prey are threatened, as the native fauna evolved in the absence of such a foraging style. Many native arthropods and snails are absent where ants are numerous (Solem 1990; Cole, *et al.* 1992; Gillespie and Reimer 1993). The aggressive species with the larger colonies have the most potential for harm (Howarth 1985a). Reduction of native insect populations also can negatively affect native birds and plants.

Some generalist feeders, especially colonial or social species, may be reducing the ranges of certain native plants. Subterranean termites (*Coptotermes formosanus*) contribute to the decline of native trees in the lowlands and change soil characteristics favoring growth of alien plants. Alien insects are implicated in the decline and endangerment of native plants. Adults of the Chinese rose beetle (*Adoretus sinicus*) often congregate on favored hosts including some endangered native plants (*e.g.*, *Hibicadelphus distans* and *Abutilon menziesii*) (Wagner, *et al.* 1985). The black twig borer (*Xylosandrus compactus*) has an extremely wide host range, burrowing into the growing tips and twigs of its host and introducing the pathogenic ambrosia fungus (*Fusarium solani*), often killing major branches or the whole tree. Its known hosts in Hawaii include 108 species in 44 families including several rare native species. It is considered to be the most important threat to the endangered *Drypetes phyllantholdes*, *Gardenia brighamii* and *Mezoneuron kavaiense* (Wagner, *et al.* 1985). The black stink bug (*Comptosoma xanthogramma*) was first recorded in Hawaii in 1966, and during its initial J-shaped population growth in the following decade, it decimated the endangered 'ohai (*Sesbanea tomentosa*).

Mutualistic relationships can synergistically increase the negative impacts of alien insects (Howarth 1985a). Alien insects spread diseases among humans, economic crops, native birds, and other native organisms (van Riper and van Riper 1985). Alien ants tend aphids and other honeydew producers that attack valuable plants (Reimer 1994). Alien pollinators assist in the spread of alien weeds (Howarth and Ramsay 1991).

About 2,000 alien species established in Hawaii arrived inadvertently. Many insects are masters at dispersal. They are common stowaways on aircraft hiding within the plane as well as in cargo. Most of the inadvertent species arrived associated with their host or the substrate used for diapause (*e.g.*, as eggs in soil, plant material, or on their vertebrate hosts). Species arriving on their hosts can be removed during inspection or quarantine, but many cryptic species escape this process. The invasibility of insects is emphasized by the convergent accumulation of the same pests on the same crops in different parts of the world. Over 400 insect species were purposefully introduced, mostly as biocontrol agents, but a few as pollinators or for other purposes. Many of these purposeful introductions have also had negative environmental impacts (Howarth 1985a; 1991).

The insects as a group make up for their relatively narrow environmental tolerance by the great number of species; that is, the number of candidate alien species able to invade Hawaii is huge. Worldwide about one million species have been described, but probably another 10 million or more remain unknown to science. Many, if not most of these could establish in Hawaii if they had the opportunity.

The taxonomic impediment, wherein a large proportion of the insects and other arthropods discovered during inspections are new to science or cannot be accurately identified, hinders effective quarantines and control. For example, the mamane moth (*Mecyna virescens*) was originally described as endemic to Hawaii, but Zimmerman (1958) sunk the species under a European species *Uresiphita polygonalis*. For the next 15 years, it was considered an alien pest in native forests and subject to control programs. Then Clarke (1971) and Monroe (1989) recognized that Hawaiian populations were distinct and endemic at least at the subspecies level, the correct name becoming *Uresiphita polygonalis virescens*. This emphasizes that both theoretical and applied ecological work must be based on accurate systematics.

5.5.4 Other Arthropods: (Spiders, Mites, Millipedes, Crustaceans, etc.)

Other arthropods present similar concerns as those described for insects, except that most groups are even less well known. A few are agricultural pests or of public health importance. The majority of alien species currently in Hawaii are in the unknown category, and in fact, for some groups (e.g., the mites), it is not yet possible to determine whether some species are native or alien. Some, like the terrestrial isopods and amphipods, are so abundant in some native habitats, that they must have a major role in nutrient cycling, but their effects on the ecosystem are unknown. Like the insects and many other groups, their commonness and therefore relative risk is related to the match of their biological requirements to the environment.

Most of the nearly 500 alien species arrived inadvertently. Only four species, all predatory mites, were purposefully introduced as biocontrol agents. Like the insects, most of the inadvertent introductions arrived via shipping and aircraft associated with their hosts or preferred substrate.

5.5.5 Worms (Earthworms, Roundworms, Flatworms)

About 50 species of alien worms are recorded from terrestrial and freshwater habitats in Hawaii, but the status of species in most groups has not been determined. For example, 127 species of plant and soil nematodes are enumerated in Eldredge and Miller (1995), without indication of which are alien species. Most worms that are agricultural pests or parasites of domestic animals that are alien species.

All 20 species of earthworms are considered alien. Recent studies on earthworms show that they change soil conditions and nutrient cycling favoring the spread of harmful alien plants. They also are food resources for pigs and other damaging animals (Vitousek and Walker 1989).

The four flatworms and two nemertines are generalist predators in both disturbed and native habitats, where they are suspected of having a detrimental effect. The flatworm *Platydemus manokwari* has been implicated in the extinction of native snails elsewhere (Hopper and Smith 1992). Some alien nematodes are parasitic on valuable plants or animals; and some of the alien invertebrate parasites transmit pathogenic bacteria among their hosts.

Risk factors include high fecundity, resistant stages, match to environment, evolutionary potential, and mutualistic relationships to other alien species. Except for some of the pest species little is known of their impacts, but novel diseases and predation are recognized as major threats to native species (van Riper and van Riper 1985).

Most alien worms are carried inadvertently via commerce, probably as resistant stages in soil or organic material, or as parasites on the host. A few, such as the insect-pathogenic nematodes and perhaps some predaceous flatworms, were purposefully introduced as biocontrol agents both officially and clandestinely by smuggling and via the U.S. Mail.

5.5.6 Fungi

Fungi remain poorly studied. About 2,000 species of fungi and lichens are recorded from Hawaii. There are a number of endemic species, but the status of most species is unknown (Eldredge and Miller 1995). Many of the disease organisms of agricultural plants and animals must be introduced. A few insect pathogens are documented biocontrol introductions, but others may be indigenous and the result of natural dispersal. One native plant associated fungus (koa rust, *Uromyces* sp.) may have become more invasive and pathogenic when an efficient insect vector was inadvertently introduced (Leeper and Beardsley 1977).

Fungi disperse naturally, and it may not be possible to sort out the origins of many species found in Hawaii. Nevertheless, there are many plant and animal diseases and other potentially disruptive species of fungi that do not occur in Hawaii. These would most likely disperse with their hosts or host products, but many could easily be dispersed within aircraft. For example, Baker (1966) found 65 species of fungi (including a few new State records) on the shoes of arriving airline passengers. The current efforts to expand world trade, especially importation of fresh foods, will greatly increase the risk of importing additional harmful species (Baskin 1996).

5.5.7 Other Micro-organisms

Bacteria and other micro-organisms have not been enumerated, and the number of species in Hawaii and their origins are unknown. Many disperse naturally on air currents and are indigenous in Hawaii. The risks and concerns relating to new alien species are similar to those described for the fungi. There are few studies on the ecological effects of free-living bacteria (Gilbert, *et al.* 1993). There is concern that the increase in world travel and trade may enhance the emergence of new human (and native animal) diseases. Already there have been a few examples (Schei 1996).

As noted for worms and fungi, risk factors include high reproductive potential, resistant stages, match to environment, evolutionary potential, and mutualistic relationships with other alien species. Pathogenic bacteria, viruses, and other infectious organisms may have high mutation rates favoring increased virulence and adaptation to new environments and hosts (LeClerc, *et. al.* 1996). Infectious diseases are considered a major factor in the decline and extinction of the Hawaiian biota (van Riper and van Riper 1985).

5.5.8 Plants

The largest group of introduced organisms in Hawaii is the plant with about 9,000 alien species listed (Eldredge and Miller 1995; Miller and Eldredge 1996). About 8,000 of these, mostly ornamental orchids, grow only in cultivation. About 900 species are established in the wild, and of these circa 100 are causing major environmental disruptions (Smith 1985). Thus most are not a problem now, but many species in cultivation represent potential time bombs.

Risks are related to the species' match to the local environment, especially pollinators, soil conditions, disturbance regimes, mutualistic relationships, fecundity, cloning ability, and climate. The fact that the orchids have not invaded much is curious and instructive. Most species produce thousands of tiny, easily dispersed seeds, but orchids also require nearly species-specific mutualistic organisms for establishment and pollination. Neither the mycorrhizal fungi nor the pollinators are well represented in Hawaii. Furthermore, these cannot establish until their associated orchids become abundant enough to support them, sort of a biological "catch 22."

Rejmçnek (1996) described the traits shared by woody weeds. He found that r-selected plants (*i.e.*, the tree species that have numerous small seeds, short intervals between massive seed set, and early maturation) were the most successful invaders. These plants also often have a relatively small genome size. Plants with early and consistent reproduction are more likely to be invaders, which seems intuitive; species that can consistently throw the most seeds into the environment are the ones most likely to win the race to colonize available open spaces.

Curiously, herbaceous weeds have the additional requirement that their success as weeds is correlated with their latitude of origin. Thus, many species are more restricted by the local climate than are many woody species. This may be analogous to the difference between the vertebrates and invertebrates in which larger vertebrates can acclimate better to local climate than can the invertebrates.

Invasiveness among weedy plants is also correlated with the presence of associated species that assist in their growth, reproduction, pollination, and dispersal. There are many examples of this in Hawaii: lantana, Christmas berry, and Firetree (*Myrica faya*) might have remained ornamental curiosities had they not been dispersed by alien vertebrates.

Possession of these characters for invasiveness is not always a prerequisite, for even slow growing plant species can cause problems if they have been widely planted for a long enough time. Often the most affected impacted areas have had the longest history of disturbance and intensive planting of aliens (Rejmçnek 1996). Also there is often a long lag period between establishment and problems that obscures defining specific invasive characters; slower growing, less rapid reproducers appear to simply take longer to become invasive (Niemelè and Mattson 1996). Therefore, it may be the opportunity for invasions rather than an inherent vulnerability of the native area or the invasiveness of the alien that is more important.

Most plant species, including most of the problem weedy invaders, were purposefully introduced. Except for a short list of known weeds, the introduction of most plants is not regulated. Given the risks, better methods of predicting problem species are needed. Also needed are effective mechanisms to recoup the costs of control and monitoring from the importers of problem species.

5.6 SUMMARY

There is an urgency to develop predictive abilities to determine potential invasive species before they establish and invade, particularly to evaluate proposals for purposeful introductions but also to develop quarantine strategies. Theories are needed that can help set priorities for quarantine and control of invasive species as well as allow the prediction of the risk of future invasions. Elton (1958) and the SCOPE project (Groves and Burdon 1986) tried to define generalities of invaders in hopes of predicting which species would become troublesome. However, these studies failed largely because they: did not integrate the characteristics of the invaders with those of the new environment; did not include data from failed invasions; and were working from incorrect assumptions. Participants at the UN

Trondheim conference (Schei 1996) were more optimistic and felt that it will be possible in the next few years to develop expert decision systems for specific regions to assist quarantine and agricultural officials to evaluate and manage proposals to import novel plants. Similar projects are underway for vertebrates (Smallwood and Salmon. 1992) and some other groups, but the many gaps in ecological data will delay usable products (Schei 1996). All groups will eventually be covered. However, species-specific idiosyncracies displayed by invading populations (*e.g.*, the increase in fecundity of house sparrows) will make some aspects of invasions unpredictable (Hengeveld 1996).

The great lag time in recognizing invasive species is a serious problem in attempts to predict pests and formulate management and quarantine programs. However, it also is an advantage if the potential pest is recognized and action begun before the invasive phase. Time is on the side of the invader if its population is allowed to persist. The rule guilty until proven innocent is the cautious and prudent one (Crooks and Soulé 1996).

The major risk factor in determining which species will become invasive may be the opportunity for potential invaders to establish populations in a new area rather than an inherent vulnerability of the invaded region or the invasiveness of the alien (Crooks and Soulé 1996). That is, any species that can successfully establish and reproduce in a new area is capable of becoming invasive.

Invading species often share a suite of characteristics that may be used to determine the most risky alien species. These include:

- Match of the needs of the invading alien to the local environment;
- Ability for rapid reproduction by short life cycle, large number of offspring, etc.;
- Low mortality;
- High mobility or presence of efficient dispersal agents; and
- Presence of associated mutualistic organisms.

The relative level of risk that an invading species will cause harm is also related to the following characteristics (Howarth 1991):

- Permanency or persistence of the organism in the environment;
- Host range;
- Habitat range;
- Genetic plasticity;

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING

Most of the nearly 500 alien species arrived inadvertently. Only four species, all predatory mites, were purposefully introduced as biocontrol agents. Like the insects, most of the inadvertent introductions arrived via shipping and aircraft associated with their hosts or preferred substrate.

5.5.5 Worms (Earthworms, Roundworms, Flatworms)

About 50 species of alien worms are recorded from terrestrial and freshwater habitats in Hawaii, but the status of species in most groups has not been determined. For example, 127 species of plant and soil nematodes are enumerated in Eldredge and Miller (1995), without indication of which are alien species. Most worms that are agricultural pests or parasites of domestic animals that are alien species.

All 20 species of earthworms are considered alien. Recent studies on earthworms show that they change soil conditions and nutrient cycling favoring the spread of harmful alien plants. They also are food resources for pigs and other damaging animals (Vitousek and Walker 1989).

The four flatworms and two nemertines are generalist predators in both disturbed and native habitats, where they are suspected of having a detrimental effect. The flatworm *Platydemus manokwari* has been implicated in the extinction of native snails elsewhere (Hopper and Smith 1992). Some alien nematodes are parasitic on valuable plants or animals; and some of the alien invertebrate parasites transmit pathogenic bacteria among their hosts.

Risk factors include high fecundity, resistant stages, match to environment, evolutionary potential, and mutualistic relationships to other alien species. Except for some of the pest species little is known of their impacts, but novel diseases and predation are recognized as major threats to native species (van Riper and van Riper 1985).

Most alien worms are carried inadvertently via commerce, probably as resistant stages in soil or organic material, or as parasites on the host. A few, such as the insect-pathogenic nematodes and perhaps some predaceous flatworms, were purposefully introduced as biocontrol agents both officially and clandestinely by smuggling and via the U.S. Mail.

5.5.6 Fungi

Fungi remain poorly studied. About 2,000 species of fungi and lichens are recorded from Hawaii. There are a number of endemic species, but the status of most species is unknown (Eldredge and Miller 1995). Many of the disease organisms of agricultural plants and animals must be introduced. A few insect pathogens are documented biocontrol introductions, but others may be indigenous and the result of natural dispersal. One native plant associated fungus (koa rust, *Uromyces* sp.) may have become more invasive and pathogenic when an efficient insect vector was inadvertently introduced (Leeper and Beardsley 1977).

Fungi disperse naturally, and it may not be possible to sort out the origins of many species found in Hawaii. Nevertheless, there are many plant and animal diseases and other potentially disruptive species of fungi that do not occur in Hawaii. These would most likely disperse with their hosts or host products, but many could easily be dispersed within aircraft. For example, Baker (1966) found 65 species of fungi (including a few new State records) on the shoes of arriving airline passengers. The current efforts to expand world trade, especially importation of fresh foods, will greatly increase the risk of importing additional harmful species (Baskin 1996).

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The relative level of risk that an invading species will cause harm is also related to the following characteristics (Howarth 1991):

- Permanency or persistence of the organism in the environment;
- Host range;
- Habitat range;
- Genetic plasticity;

- Behavior;
- Mutualistic relationships; and
- Vulnerability of the target region.

Given the great range of environments in Hawaii in general and on Maui in particular, a large percentage of the world's biota may find a suitable habitat in Hawaii. Tropical source areas are a greater risk than temperate areas. Each "new" source area added can bring in new candidates; that is, Hawaii already has many invaders from North America; additional introductions of the same species may not be detected even though they may increase the risk by introducing new genotypes. However, flights from new areas will likely bring novel harmful species that had not previously had the opportunity to invade. Fortunately, experience from purposeful introductions suggests that most introductions fail. Thus, to be worthwhile, pest prevention measures need to reduce the rate of arrivals of alien species below a certain threshold level.

Historically, Hawaii has been highly vulnerable to the effects of invasions. In large part this results from the high level of disturbance and habitat alterations by humans; its great isolation that has allowed the evolution of a naive native biota vulnerable to the novel effects of aliens; the great range of environments in a small area that gives an alien a greater chance of finding its preferred habitat; and the small area which restricts the availability of refuges from novel perturbations (Howarth and Ramsay 1991).

5.6.1 Quarantines

Quarantine and inspection strategies should be geared to the type of organism and method of introduction. Most vertebrates and plants are imported purposefully either legitimately or by smuggling. A few invertebrates and microbes also are intentionally introduced usually by government agencies for biocontrol, but increasingly by smuggling by pet enthusiasts, organic gardeners, and others (*e.g.*, Hunter 1994). Legitimate purposeful introductions need to be regulated, thus also simplifying quarantines and inspections at the time and place of arrival. Smuggling requires additional vigilance and investigative procedures; in 1994, Hawaii Department of Agriculture inspectors captured nearly 100 illegal reptiles and amphibians in Hawaii (CGAPS 1996). The major avenue for long-distance dispersal for other organisms is hitch-hiking on purposefully introduced organisms; therefore regulation and inspection of purposeful introductions will help intercept the hitch-hikers as well. Unfortunately, many serious invaders, especially invertebrates, arrive as stowaways necessitating additional preventative treatment and inspections of aircraft and cargo.

Quarantine procedures and inspections should be designed to educate the public on the dangers posed by alien species. Education programs run in conjunction with pest prevention programs can instill an appreciation for the seriousness of the problem among

the public sector. This reinforcement can become a beneficial feed-back process since, to be maximally effective, quarantines and inspections need active public support.

5.6.2 Conflict of Interests

Some invasive aliens are perceived as important economic resources; in these instances, it is important to perform accurate cost benefit and risk analyses before the purposeful introduction is made. If the introduction is approved, the costs associated with monitoring for impacts and control should be shifted to the importers through bonding, insurance, liability, or other methods. The history of introductions of apple snails to Hawaii and elsewhere for food production is an example of the false economy of not conducting pre-release analyses (Cowie 1995; Vitousek, *et al.* 1996).

We need to change cultural mores that favor introduction of alien species and increasingly place the costs associated with alien invasions on the importing persons and agencies. Persons releasing organisms beyond their natural range undertake a grave responsibility; once released these agents are pervasive (*i.e.*, able to disperse far beyond the target system), permanent (i.e., able to multiply and evolve in perpetuity), injurious (*i.e.*, able to harm nontarget organisms), and insidious (*i.e.*, able to affect ecosystems, sometimes in profound ways). Long-term ecological studies are needed on both the efficacy and environmental impacts of all purposeful introductions to make applied ecology more predictive and to produce more appropriate protocols governing proposed introductions. Given the risks, more open public oversight and more comprehensive regulations of all proposals to introduce and release non-indigenous organisms are required.

SECTION 6
IMPACT OF ALIEN SPECIES

6.1 INTRODUCTION

The impacts of alien species on protected, *i.e.*, listed or candidate species, as well as unprotected plant and animal species could range from extinction to severe economic effects, especially on agricultural crops (OTA 1993; CGAPS 1996; and Howarth 1985a), as well as adverse effects on human health and safety and cultural factors[1]. Alien insect species affect nutrient cycling in natural ecosystems, disrupt plant communities, and cause animal and plant diseases. Alien reptile species could result in the extinction of endemic and introduced bird and small mammal populations and other alien vertebrates could result in the continued decline of Hawaii's biodiversity.

The greatest toll taken by alien species in Hawaii has been on the natural areas. Natural areas, while not producing commodities like timber in sustainable amounts, are of value for their biological diversity, maintenance of freshwater supplies, scenery, recreation, and as a scientific laboratory. Natural areas make up about 25 percent of the land area of Hawaii and still support indigenous species in relatively intact habitats.

Hawaii's diverse indigenous species all evolved from a small number of colonizers. The biota of Hawaii evolved in isolation. As noted by Howarth (1985a), only those few unusually vagile or lucky groups that were able to cross thousands of miles of ocean colonized the islands. One of the best examples of this process is Hawaii's 600, or more, species of fruit flies. These flies are all the evolutionary descendants of one colonizing species. Similarly, a single colonizing finch species gave rise to 40 varied species of honeycreepers (OTA 1993).

6.2 EXAMPLES OF POTENTIAL IMPACTS

Knowledge of island ecology is insufficient to fully assess the effects of alien species on native biota. However, given the major role of invertebrates, especially insects, in the nutrient cycling in natural ecosystems, alien invertebrates have the potential to cause serious disruptions to natural systems. A large number of alien insects feed on endemic plant species, sometimes causing severe defoliation (Howarth 1985a). The widespread defoliation of koa (*Acacia koa*) by the plant louse *Pyslla uncatoides*, represents serious perturbation to the trees and their associated fauna and flora, as well as hydrology, agronomy, and nutrient cycling (Howarth, 1985a).

As defoliation occurs in the canopy species of a forest, the subcanopy changes also. The loss of the canopy trees, such as mamane or koa, results in a loss of habitat for those

[1] As indicated previously, while alien species may affect natural and social factors, this BA is concerned with the potential effects on listed and candidate plants and animals and critical habitats.

species utilizing the trees for food, cover, nesting or resting sites. This, in turn, affects the species on which those organisms feed and live. Similarly, defoliation of the canopy trees results in changes to the subcanopy trees and shrubs, generally by allowing more sunlight to penetrate to the ground, thereby changing the species composition of the subcanopy. The alteration of the species living in the subcanopy may allow invasive species, such as weeds and grasses, to dominate the plant community. This results in alterations of the animal species habituating the affected area and could result in the extinction of plant and animal species dependent upon the original natural plant community. The eventual result could be a permanent loss of the natural habitat and the complete takeover of an area by alien species.

Other examples of alien species effects are seen in the adults of the Chinese rose beetle (*Adoretus sinicus*). These beetles congregate on favored hosts and create large rectangular holes in the leaves. This can leave the plants susceptible to disease and possible eventual death, which could cause disruptions to the plant-soil nutrient cycle and a change in the habitat characteristics such that native plants and animals are forced out of the area.

Some generalist feeders, such as aphid, whiteflies, scale insects, and termites, may be reducing the ranges of some native plants. Alien insect species, such as the black twig borer (*Xylosandrus compactus*) are implicated as important factors in the decline and endangerment of several native plants such as *Charpentiera* sp., *Claoxylon sandwicense*, *Flueggea neowawraea*, *Cryptocarya oahuensis*, *Alectryon* sp. and *Santalum freycinetianum* (Howarth, 1985a).

Damage by feral ungulates (hoofed animals) is one of the main introduced alien species threats to forests and other natural areas. It is estimated that the cost of fencing two important areas of Haleakala National Park with 45 miles of fencing was $2.4 million (OTA 1993). Maintenance of fences, because of damage from storms, humidity, tree falls, and other reasons, costs about $130,000 per year.

Weeds constitute the second main alien species threat to natural areas. About 90 of the estimated 900 established alien plant species in Hawaii are serious weed pests capable of invading undisturbed natural areas. At Hawaii Volcanoes National Park, the alien species plant problem is especially severe with 30 of the worst plant pest species present, 24 of which are widespread (OTA 1993).

As an example, Fountain Grass (*Pennisetum setaceum*), a large, coarse, perennial grass from Africa, was introduced to Hawaii as an ornamental grass for gardens. Its seeds are easily dispersed by wind currents and it now covers broad areas of the west Hawaii lava fields and has moved into the lower level mesic forest areas, displacing native plant species. While this grass serves as food and cover for a variety of animal species, mostly introduced, such as mice and rats, which are fed upon by barn owls and other birds, it has displaced naturally occurring subcanopy plant species which are the habitat of endemic and indigenous animal species.

As noted above, alien insect species also threaten natural areas, by competing with or preying on indigenous species and altering pollination patterns. Two of the worst insect pests currently in Hawaii are the Argentine ant (*Linepithema humiles*) and western yellow jacket (*Vespula pensylvanica*).

The greatest threat to the Haleakala silversword (*Argyroxiphium sandwicense* ssp. *macrocephalum*) appears to be potential loss of endemic pollinators because of the invasion of the silversword habitat by the Argentine ant and its predation on natural pollinators that evolved in the absence of ant predation (Loope and Medeiros; Cole *et al.* 1992). Similarly, Gillespie and Reimer (1993) have described the effects of alien ant species on endemic spiders in mesic and wet forests throughout Hawaii. In general, they found some endemic spiders did not occur in the same habitats as alien ants, presumably because of predation by the ants.

The aggressively predaceous western yellowjacket (*Vespula pensylvanica*), established in Hawaii in 1977 or 1978, and found on all Hawaiian Islands, produces overwintering colonies that exhibit large numbers of workers that forage for protein to feed workers, queens and males. Workers often form a single colony of 40,000 individuals who may devour 40 million prey items in a three-week period (Loope, 1996). In Hawaii, and especially at Haleakala National Park, populations of native insects, including native pollinators and rare species with highly restricted distributions, have shown declines corresponding to population explosions of the western yellowjacket (Howarth and Medeiros 1988). In New Zealand, foraging *Vespula* species displace native forest birds by preempting the honeydew resource of the southern beech forests (Loope, 1996). Gambino, Medeiros and Loope (1987 and 1990) have also described the effects of western yellowjackets on native arthropods and vegetation.

Similarly, the black stink bug (*Comptosoma xanthogramma*) has threatened to become a serious pest of legumes, and it decimated the rare 'ohai (*Sesbanea tomentosa*) during the decade following its arrival in Hawaii. Populations of the solanaceous treehopper *Antianthe expansa*, discovered on Oahu in mid-1971, exploded on various cultivated and wild solanaceous hosts, often killing them.

The decline in lowland populations of koa (*Acacia koa*) is augmented by the Formosan subterranean termite (*Coptotermes formosanus*), which severely weakens older trees and shrubs. Because seed production in koa is being limited by predation by alien invertebrates and its seedlings are being defoliated by predation of alien Lepidoptera and other herbivores, most of the fallen trees are not being replaced in the lowlands. This, as noted earlier, causes severe disruptions in the entire habitat and plant community by forcing out naturally occurring plants and animals, and, in some cases, causing their extinction from the area.

A number of other examples of the disruptions in natural ecosystems by alien species in Hawaii include predation and parasitism of native animals. A large proportion of alien invertebrates are predaceous or parasitic (Howarth 1985a). Ants, and particularly the big-

headed ant, have been implicated in the extinction of native species in Hawaii. Also, ants can competitively exclude some predators by efficiently consuming most of their prey.

Alien invertebrates are also vectors for plant diseases, and some pose serious threats to native flora. Plant feeding mites are well adapted to transmitting a variety of plant diseases. Similarly, alien invertebrates may harbor alien diseases and act as carriers or reservoir hosts, facilitating the spread of diseases among susceptible hosts.

Mosquitos are another insect group that can pose serious health threats to endangered animal species as well as humans. Should a mosquito species become established in Hawaii that is capable of transmitting avian malaria to higher elevations than the *Culex quinquefasciatus*, the existing avian malaria transmitting mosquito in Hawaii, three to five species of Hawaiian honeycreepers could be driven to extinction (Loope, 1996).

Worldwide, predaceous ants are an important ecological force. Hawaii lacks native ants. Therefore, the native insect fauna, including pollinators, are vulnerable to an ant invasion. Maui rain forests and high-elevation sites still lack ants and, therefore, posses a reasonably intact insect fauna. The inadvertent introduction of an ant species capable of living in these habitats could seriously threaten the integrity of these habitats.

Alien insect species are also a serious and costly threat to the State's agriculture industry. Many agricultural pests arrived in Hawaii on agricultural material that was imported to improve genetic stocks or to introduce new crops. The pests, such as fruit flies, not only destroy crops, but also limit markets on the mainland U.S. and foreign areas that have imposed quarantines on produce from Hawaii because of the threat of new pests. This loss is often cited as the primary barrier to the expansion of Hawaii's diversified crops (OTA 1993). The sugar cane borer (*Rhabdosclelus obscurus*) is an important pest of sugar cane. The lesser cornstalk borer (*Elasmopalpus lignosellus*) has cost losses estimated at $9 million in lost yields and other costs since it appeared in 1986. Other agricultural costs are incurred in chemical control of alien species.

Other animal taxa that could cause serious disruptions to Hawaii's natural and man-made ecosystems include snakes and other vertebrates. For example, many snakes are generalized predators that could cause devastating problems for biodiversity in Hawaii if they become established.

Not only would native bird populations be threatened, but so would introduced bird and small mammal populations, thereby causing further perturbations to natural and man-made ecosystems. Savage (1987) has described how the native forest birds in Guam have experienced precipitous declines due to the introduced brown tree snake (*Boiga irregularis*).

Other vertebrates that could cause serious disruptions to Hawaii's natural systems include mammals, birds, reptiles and amphibians. Examples include Jackson's chameleon, which is well established on Maui and may pose an eventual threat to forest birds through competition for invertebrate prey in high-elevation rain forests (Loope 1996).

Slugs and snails have become widespread agricultural pests in Hawaii and may pose a serious threat to native plant species. The common garden slug, *Milax gagetes*, has been ·-ted on greensword (*Argyroxiphium grayanum*) in a remote, high-elevation rain forest area of east Maui (Loope, 1996). Slug predation has also been observed to damage several rare plant species on Maui, including *Ranunculus mauiensis* (a species of "Special Concern"), several lobelioids, and the endangered *Schiedea haleakalensis*.

6.3 POTENTIAL IMPACTS OF ALIEN SPECIES ON MAUI

The potential increased impacts that might result from the Proposed Project are difficult to define because of several factors, not the least of which is that no one knows what species might be introduced, nor by which pathway, *i.e.*, aircraft or surface ships, they might be introduced. As previously described in Section 1 and shown in Table 1-5, domestic airline passengers are suspected of being one of the primary pathways by which alien plant and animal species enter the State. Because envisioned overseas flights are expected to originate from the U.S. mainland and other North American cities, as well as from Korea and Japan in Asia, examples of selected alien species that might inadvertently or purposefully be carried on these flights, and their potential impacts are described below. These examples (Table 6-1) were selected to illustrate the range of pathways by which an alien species might gain entry to Maui at Kahului Airport. The examples focus on organisms from the areas noted above. However, the increasing use of hubs and containers in airline travel means that the actual origin of a particular flight or its passengers and cargo may be distant from one of these areas.

TABLE 6-1
SOME ALIEN ORGANISMS THAT COULD INVADE MAUI, THEIR ORIGIN AND POSSIBLE MODES OF ARRIVAL AT KAHULUI AIRPORT, MAUI

Common Name	Origin	Modes of Travel
Snakes	U.S. Mainland, Japan, Korea	Purposeful as illegal pets and as stowaways
Birds (Parrots, etc.)	U.S. Mainland	Purposeful as pets
Formicidae (fire ants, weaver ants)	U.S. Mainland	Stowaway in aircraft or containers; purposeful as clandestine biocontrol
Culicoides spp. (Biting midges)	Japan, Korea, and North America	Stowaway on aircraft and immature stages in substrates
Melastomes	Southern North America and Latin America	Purposeful as ornamentals and seeds on clothing

6.3.1 Snakes

The danger to native fauna posed by the brown tree snake is now well known (Savage 1987); however, most snakes are general predators, attacking anything they can catch and preferring different prey as they grow larger. It is likely that any one of perhaps hundreds

of species of the nearly 3,000 species of snakes known worldwide could cause equally or worse devastating problems for biodiversity than the brown tree snake if one of them became established on a Hawaiian island.

The most problematic species are the arboreal predators of warm-blooded prey that have the opportunity to travel to Hawaii. Also, many snakes prefer wetland habitats and, if established, would further threaten the endangered waterfowl. Snakes can arrive in Hawaii on airplanes in two ways: smuggled in as pets and inadvertently carried as stowaways within aircraft or cargo.

6.3.1.1 Pets

A number of boas (Boidae) and rat snakes (Colubridae) are increasingly becoming popular as pets (both legally and illegally) in North America and elsewhere. Furthermore, the enterprising pet trade is making many species available, also legally and illegally (Anon. 1996). These pets represent a real threat to the Hawaiian fauna as they can be purposefully carried to Hawaii.

Snakes are banned from Hawaii, but several species have already been captured in the state; *e.g.*, during 1994, 32 snakes were captured in Hawaii (CGAPS 1996). Among popular pest species, two groups (which actually comprise about 2/3 of the living snake species) especially stand out as serious threats to native Hawaiian wildlife should they become established. These are the boid, *Python molurus*, (boas and pythons) and colubrids (especially the rat snakes in the genus *Elaphe*). The boid, *Python molurus*, has been the most frequently transported species and has been intercepted in Hawaii several times during the last few years. *P. molurus* is native to India, southern China, and Southeast Asia and can grow to 20 feet long (Taylor 1965). It, like most pet boas, are tropical species and, therefore, might not range far into the more temperate highlands in Hawaii, but there are exceptions, and an invading species may acclimate to local conditions. Some pythons and other boids prefer wetland habitats (Taylor 1965) and could pose a threat to endangered waterfowl in Hawaii. There are about two dozen boid species commonly kept as pets.

Amond the colubrids, a few *Boiga* species are occasionally kept as pets, notably the mangrove snake, *Boiga dendrophila* from Asia. Approximately a dozen species of rat snakes are also popular pet animals. Both temperate and subtropical species are kept in captivity. Some of the temperate species could invade to near tree line and could rapidly cause the extinction of most Hawaiian forest birds, including not only officially endangered species, but many native species not currently considered endangered. *Elaphe* species are good climbers and eat birds, rodents, lizards and frogs (Conant 1975). Native birds within the native range of rat snakes often have evolved elaborate defensive strategies; for example, the red-cockaded woodpecker encourages large deposits of conifer sap around the entrance of its treehole nest specifically to discourage *Elaphe* rat snakes (Attenborough 1984). Native Hawaiian forest birds would be expected to lack such defenses against snakes.

6.3.1.2 Stowaways

Many snakes actively seek either daytime or night-time hiding places (Conant 1975), as well as refuges for digesting meals. They often stay in hiding a week or more after a meal (Taylor 1965). This behavior makes many species frequent stowaways especially in cargo holds and containers. The brown tree snake, *Boiga irregularis*, is thought to have entered Guam in this way, and several animals have been caught in Hawaii and other Pacific islands (Fritts & al. Subm.). The venomous *Pseudonaja textilis* is thought to have been introduced into New Guinea by World War II traffic from eastern Australia (Slater 1968). *Dendrolaphis caudolineatus*, from southern India, Malaya, and Indonesia, is an active diurnal arboreal predator that has been intercepted in shipments as far away as Saipan and Pohnpei. Its more tropical distribution suggests that this species might do well in the lowlands on Maui, but probably would not invade the coolest and wettest forests.

Lycodon aulicus is a nocturnal arboreal predator from southern Asia and Indonesia with a propensity to travel with humans. It became established on Réunion in the early 1800s presumably imported from India in bales of rice (Cheke 1987) and by the 1870s had also established on Mauritius (Cheke 1987). On Réunion, it was blamed for the near extinction of native day-geckos (Cheke 1987). It recently established on Christmas Island in the Indian Ocean (Fritts 1993) and has been intercepted on Pohnpei in a shipment of Philippine lumber. Leviton (1965) believed that *L. aulicus* also was introduced to the Philippines and Indonesia within the last 200 years. Its closest relative, *Lycodon capucinus* with which it is often confused, is a domestic species in Southeast Asia where it preys preferentially on house geckos (Taylor 1965). Thus, *L. capucinus* could also travel in household goods and especially containerized cargo.

In Thailand, native *Lycodon* species live as high as 7,500+ feet (2,300 meters) in the mountains (Taylor 1965), which would have a similar environment to the upper limit of Hawaiian forest birds on Maui. All *Lycodon* species are small, barely reaching 3 feet (1 m) in length, and they are agile tree climbers (Taylor 1965).

6.3.2 Birds

Birds are notorious invaders of natural ecosystems on both continents and islands (Ebenhard 1988; OTA 1993). Two factors are responsible: First, their warm bloodedness, great mobility, generalist food requirements, behavioral plasticity, and relatively high tolerance to environmental extremes make many bird species superior competitors. Second, they are considered aesthetically and culturally important, and as different human cultures have migrated to new areas, they have taken representatives with them.

Worldwide, over 200 species have been purposefully introduced and successfully established in 771 new areas (Ebenhard 1988). Fortunately for agriculture and natural areas, most introductions failed to establish. These 771 "successes" are a fraction of the total attempted; in Hawaii over 150 species of birds were introduced, of which 46 successfully established (Miller and Eldredge 1996). Many of these 46 species are invasive,

spreading alien plant and bird diseases, competing with and preying on native species, and altering ecological processes in native and disturbed habitats (Cuddihy and Stone 1990).

The acclimatization societies responsible for most of the historic introductions are no longer active; and the major source of alien species currently are escapees and releases resulting from the pet trade. For example, 22,000 birds were brought into Hawaii in 1989 mostly for the pet trade (OTA 1993). This change in pathways, *i.e.*, purposeful introductions, gives additional bird species the opportunity to invade new areas. One of the most popular taxonomic groups among bird fanciers is the parrot and their relatives (*Psittaciformes*). Ebenhard (1988) found that parrots were disproportionately well represented among the successful colonizers with 28 (13 percent) of the species and 61 (8 percent) of all introductions being parrots. Fourteen species are established in the continental U.S., the second largest group after game birds (Nisson 1981). In contrast, none are well established in Hawaii, but that could change as a number of small flocks of several species are feral. A flock of 28 to 32 Amazon parrots was sighted flying near the Twin Falls area in February 1997 (Hurley 1997). Furthermore, increasing pressures by the pet industry may allow more to enter. Thus, the potential impacts of parrots are reviewed here.

Introduced birds, like other groups, are usually more successful in habitats similar to those exploited in their native land, and most early introductions were species adapted to live in human-disturbed habitats in their native area. Thus, many alien birds have not invaded natural areas (Ebenhard 1988; Usher, *et al.* 1988). However, many parrots in the pet trade are forest birds, and if these escape, they can be expected to invade native forests. Parrots feed on fleshy plant parts, especially fruits and seeds. In North America, the invading monk parakeet has stripped buds, flowers and fruits from favored trees, severely affecting growth and survival of some native trees (Ebenhard 1988). Some endangered Hawaiian plants may be vulnerable to this sort of depredation.

In Hawaii, parrots would be a major new factor in the spread of invasive plant species. They are capable of feeding on larger fruits than other established birds and could distribute larger seeded plants out of gardens into native forests. They are also strong fliers and could more rapidly spread alien seeds into the most remote habitats, crippling weed control efforts. These new alien plant species could compete with native species, driving some to extinction. For example, pigs and pheasants are the important dispersers of banana poka, an invasive liana in Hawaiian forests (Cuddihy and Stone 1990). Neither of these groups disperse far after feeding. An invasive parrot could change the rate of spread, distribution, and invasiveness of the plant.

Alien birds are recognized as major reservoirs for bird diseases (van Riper and van Riper 1985); parrots would significantly increase the threat of diseases to endangered birds. Also, since an increasing proportion of parrot introductions is illegal, there is an increasing threat of new diseases being introduced. In the 1970s, the introduction of the devastating Newcastle disease of birds into the U.S. was traced to a shipment of illegal parrots from Mexico. Only severe quarantines and eradication programs prevented the disease from spreading and becoming firmly established (Nilsson 1981). In Hawaii, Newcastle disease

would result in massive declines or extinctions of the remaining endemic birds if it became established. The threat posed by parrots, especially the import of illegal birds, is real.

Nearly all parrots nest in cavities; and all but one of the 28 introduced parrot species nest in cavities (Ebenhard 1988). Since there are no other large cavity builders (e.g., squirrels and woodpeckers) in Hawaii, nest sites may be limiting, and most parrots may require a long lag period before becoming invasive. However, they can make their own cavities and, over time, could become invasive.

Parrots and other alien birds can arrive on flights from anywhere. In the 1970s Japan supplied a minute portion of the imported pet birds to the U.S., but during the same period the country was a major importer of tropical cage birds (Nilsson 1981). Increasingly, illegal shipments are using complex circuitous routes and devices to escape detection (Anon. 1995).

6.3.3 Formicidae

Ants are notorious invaders, and recognized as a cause of native species extinctions, both in Hawaii and elsewhere (Cole *et al.* 1992; Gillespie and Reimer 1993; Hölldobler and Wilson 1994; Reimer 1994; Wilson 1996). About 40 species are established in Hawaii (Nishida 1994), and those with large, aggressive colonies are the most problematic (Howarth 1985; Reimer 1994). There are numerous alien ant species that could invade new habitats or attack different prey if they became established in Hawaii. Two examples are described: The fire ants, which are currently serious invaders of southern North America, and the weaver ants, which are dominant forest canopy predators in the old world tropics and subtropics.

6.3.3.1 Fire Ants

Two species of fire ants were inadvertently introduced from South America to the Southeastern U.S.: *Solenopsis richteri* about 1918 and *Solenopsis invicta* about 1940, and both have become problem invasive species (OTA 1993; Callcott and Collins 1996). Both species were most likely introduced via surface ship cargo. *Solenopsis invicta*, especially, has been implicated in the extirpation of native species in areas where it has invaded. *Solenopsis* nest in the ground, usually in open habitats and open woodlands. If these warm temperate species established on Maui, they probably would invade at least low and mid-elevation dry forests and open country. Their upper elevation limit is unknown, but their subterranean nests are protected from most frosts. The open alpine dry shrublands in Haleakala National Park appear to provide an ideal habitat for these species, but the cool temperatures might limit their distribution near the summit and within the crater.

Fire ants are voracious predators of small animals, feeding the protein to their larvae. Few native invertebrates would escape their depredations. Native ground-nesting birds, such as the endangered Dark-Rump Petrel, would be especially vulnerable, if the ants can survive near the bird colonies. Adult ants also feed on sweets such as nectar and honeydew. Thus, they could disrupt reproduction and survival of native

plants and favor invasions of certain alien plants and honeydew producing insects. Many plant and animal extinctions would be expected to occur in the surviving lowland dry forests on Maui, for example those at Kanaio and Auwahi.

Most of the dispersal and invasion of southeastern North America has been by slow outward spread, but there have been jumps probably the result of human aided transport. Between 1975 and 1983 *S. invicta* became established in Puerto Rico, possibly in used oil field equipment shipped from the U.S. (Callcott and Collins 1996). A colony of *Solenopsis invicta*, was intercepted in Honolulu in a package from Texas in 1991 (CGAPS 1996). As the species expands its range in North America, it will have greater opportunity to be transported to Hawaii.

S. invicta reproduce in two ways: individual fertile queens establishing new colonies, and polygyne (multiple-queen) colonies splitting and part of the colony walking to a new nest site (Shoemaker and Ross 1996). Polygyne colonies pose a greater invasive threat and are more likely to establish if transported, but they are also far less likely to disperse long distances. In fact, it is highly improbable that a polygyne colony would arrive on Maui by plane, except by the unlikely inclusion of a colony in soil, such as in a containerized shipment or soil on earth-moving or construction equipment. Fertile females, on the other hand, could become stowaways in planes, in cargo, and containers. Their mating swarms could fly near packing areas or even airports, increasing the likelihood of gaining access to shipments. Such transported mated females would probably have shed their wings by the time of arrival and, therefore, would most likely only be able to establish near their site of disembarkation.

6.3.3.2 Weaver Ant

The Asian arboreal weaver ant [*Oecophylla smaragdina* (Fab.)] is widely distributed from Asia to Australia, where it occupies a wide range of forest habitats from savanna and monsoon dry forests to more mesic habitats and rain forests (Hölldobler and Wilson 1994). A closely related species lives in Africa. Weaver ants use their larvae as spindles to weave nests in the canopy, and their ability to select an optimal environment within the canopy for their nests gives the species a wide tolerance for different forest types. Given its known distribution and preferred environments, it would be able to invade all forested habitats on Maui except perhaps the wettest rain forests and the coldest sites.

The ant is a voracious arboreal predator, which can exclude all sensitive animals from its nest tree as well as closely neighboring trees. Colonies can contain 500,000 or more workers, and control a territory of a dozen or more large trees (Hölldobler and Wilson 1994). They control the entire tree surface from the ground up and kill virtually all animals found within their territory (Hölldobler and Wilson 1994). Few birds would be able to nest or forage near an active ant nest. Thus both native invertebrates and several native forest bird species, as well as the endangered tree-roosting native bat, would be severely affected, and the extinction of many currently listed species as well as many currently non-endangered species would be expected if this species established on Maui.

The weaver ant has been introduced to south Pacific islands for biocontrol of palm pests (Greenslade 1965). However, its effects on either the intended target or potential nontargets have not been recorded. It could be introduced into Hawaii illegally by well-intentioned gardeners returning from Asia. Less likely is the possibility that fertile queens could arrive as stowaways in aircraft or in shipments of cut flowers or other plant material. The exceptionally complex behavior makes weaver ants popular research animals. The related African species is established in entomological laboratories in the US (Hölldobler and Wilson 1994) and could be moved to Hawaii. Hölldobler and Wilson (1994) describe a method to transport small colonies within hand luggage on aircraft.

6.3.4 *Culicoides* (Family Ceratopogonidae)

Biting midges in the genus *Culicoides* are important veterinary and public health pests in most areas of the world (Linley and Davies 1971). There are over 1,000 valid species, and many more still to be discovered and described. Over 40 species are known from Japan and Korea (Arnaud 1956; Wirth and Hubert 1989), 168 species from Southeast Asia (Wirth and Hubert 1989), and about 135 from North America (Wirth 1965).

The biology of most species remains unknown. The larvae are predators or scavengers on tiny invertebrates in semi-aquatic and aquatic habitats; larval substrates include damp rotting plant material, animal dung, mud, and soil in tree holes, compost heaps, rotting vegetation, margins of water bodies, and a variety of aquatic habitats (Jamnback 1965; Howarth 1985b). Each species prefers particular larval habitats, and in concert most potential larval substrates are exploited. Adult females of many species are specialized to suck vertebrate blood: some generalists, some attacking birds, others small or large mammals, etc. (Jamnback 1965). They are important transmitters of diseases, including blood protozoans (especially the primitive bird malarias), filarial worms, viruses, and other parasites among birds (Kettle 1965; Wirth and Hubert 1989). In addition, they also would increase the spread of mechanically transmitted diseases of birds (*e.g.*, avian pox).

Adult females of most species are readily dispersed by wind (Linley and Davies 1971) and attracted to lights at night (Howarth 1985b). *Culicoides* are very small; most adults are less than 0.02 inches (2 mm) long. Unless the species bite humans (which many do) or otherwise became conspicuous, their impact on endangered birds would go unnoticed until too late. To illustrate the potential impacts of these alien species on Maui, the potential threats posed by two species will be described: *Culicoides arakawae* and *C. obsoletus*.

6.3.4.1 *Culicoides arakawae*

Culicoides arakawae (biting midges) is widespread in Asia from Japan south to the Indonesian islands and west to India (Arnaud 1956; Wirth and Hubert 1989). The species does well in both tropical and temperate climates, but whether its range results from different strains is unknown. Arnaud (1956) reported it to be the most abundant and widely distributed *Culicoides* in Japan. It breeds in mud and soil at water margins, especially where polluted, such as animal wallows, ditches, flumes, streams, and pools (Kitaoka and Morii

1963; Howarth 1985b). Near Tokyo, the species has two to three generations per year with a minimum life cycle of 30 days (Kitaoka and Morii 1963). The species probably can breed continuously in the tropics; adults were collected in most months of the year in Laos (Howarth 1985b).

The adults readily attack birds and sometimes mammals (Arnaud 1956), and the species is considered to be the most important vector of the bird protozoan parasite *Leucocytozoon caulleryi*, a serious disease of poultry in east Asia (Kitaoka 1978) and fowl pox virus (Fukuda *et al.* 1979). Fowl pox is already recognized as a severe disease among Hawaiian endangered birds (van Riper and van Riper 1985); thus the establishment of an efficient new vector would pose a significant new risk. Adult *C. arakawae* are readily attracted to lights (Arnaud 1956) and are easily transported on the wind; they are, therefore, potential stowaways on aircraft departing from infested areas at night.

Female *C. arakawae* deplaning at Kahului would find abundant ideal suitable breeding habitats in the immediate area surrounding the airport, both at Kanaha Pond and in the irrigation ditches and pools in and near cane fields. From these lowland habitats the species could easily disperse on the wind to rain forest habitats on both east and west Maui.

The endangered water fowl at Kanaha Pond and other wetlands could be severely impacted both from exsanguination (loss of blood) and from exposure to new diseases. Breeding habitats may be more limited in the upland rain forests, except for pig wallows and some natural pool margins; however, the species could adapt over time to breed in the constantly moist soil in the wet forests of Hawaii. If it did become abundant, it would cause the declines of several native forest birds.

6.3.4.2 *Culicoides obsoletus*

Culicoides obsoletus (biting midges) is one of the most widespread species of biting midges, occurring in north Africa, Eurasia and North America (Jamnback 1965). It is recorded from both South Korea and Japan, where it is widespread on Honshu and Hokkaido (Arnaud 1956). In North America, it is found from southern Canada to North Carolina and Tennessee in the east and from British Columbia and Alberta to northern California in the west (Jamnback 1965). It is a serious pest of humans and animals on Hokkaido (Arnaud 1956) and in North America (Jamnback 1965). Larval breeding substrates include damp terrestrial habitats, shaded seeps, moist straw, decaying spruce needles, cornstalks, soil polluted with chicken or horse manure, straw mixed with cow manure and moist substrates in sphagnum bogs and marshes (Jamnback 1965). There are two generations a year (Kitaoka and Morii 1963).

The wide range of larval breeding habitats indicates that the species could become invasive in Hawaii. Suitable breeding habitats on Maui include Kanaha Pond and the cane fields near the Kahului Airport, as well as the moist forest floor in the rain forests. If overwintering larvae diapause, they would not be successful in lowland habitats, but this species would probably survive very well in cool upland forests where the major populations

of endangered forest birds survive. Emerging females do not require a blood meal to develop their first clutch of eggs, making establishment of colonizers more likely but perhaps decreasing their role in disease transmission. In suitable habitats, they can become incredibly abundant, severely worrying their hosts.

Like *C. arakawae* adult *C. obsoletus* are readily attracted to lights and are easily transported on the wind; they are, therefore, potential stowaways on aircraft departing from infested areas at night. Additionally, immatures of this species could be inadvertently imported on sphagnum or other moist materials used to pack shipments of living organisms and cut flowers.

6.3.5 Melastomes

The plant family *Melastomataceae*, of which there are no native members, is notorious in Hawaii for its invasive potential (Plucknett and Stone 1961). Of 15 species introduced to Hawaii, 14 have escaped from cultivation (Wagner *et al.* 1990). At least five have come disruptive invaders, and three (*Miconia calvescens*, *Clidemia hirta*, and *Tibouchina urbacea*) are among Hawaii's worst invasive plant pests. Although further introductions from the family have been officially banned, there are about 4,500 species in the family, most of which may be potential invaders. The woody genera *Miconia* (1,000 species), *Clidemia* (175 species), and *Tibouchina* (250 species), all native to the Notropis (Conquest 1981) probably pose the greatest threats. Most of them have striking leaf-venation and fruit prolifically, so there is certainly much potential for ill-informed or ill-intentioned "ecotourists" to nature preserves of the Notropis to bring back seeds to grow in wet, tropical environments of Maui. For example, La Selva, a 1,500-acre reserve in Costa Rica at 330 to 9,800 feet (100 to 3,000 m) elevation has 25 species of *Miconia* and 13 species of *Clidemia* (Gentry 1990). Any one of these would be very likely to establish and spread on Maui if introduced. Any one of them, released from its natural enemies, could prove to rival *Miconia calvescens* or *Clidemia hirta* in invasiveness.

The invasive melastomes are understory plants capable of growing in dense thickets that allow virtually no other plant to grow beneath their shade. Their effects on the native forests are devastating; the structure of the forest is changed, with the native understory plants, their associated insects and other organisms eliminated (Cuddihy and Stone 1990).

Although the species now in Hawaii were introduced as ornamentals, the rise in travel opportunities and ecotourism could provide additional avenues for dispersal. Many species (*e.g. C. hirta*) have fruits filled with tiny sticky seeds that are easily transported on boots and other clothing of hikers. Visitors from infested areas could unwittingly transport seeds of one or more species with them.

SECTION 7
AGENCIES RESPONSIBILITIES AND LIMITATIONS

7.1 INTRODUCTION

This BA assesses the potential impacts of an incremental increase in alien species introductions due to the Proposed Project on listed or candidate plant and animal species and designated or proposed critical habitats. It is acknowledged that any controls or mitigation of this incremental increase in the introduction rate will also assist in controlling the present alien species arriving at Kahului Airport.

At the Federal and State agency level, there are two agencies charged with the protection of listed or candidate plant and animal species: (1) the U. S. Fish and Wildlife Service (FWS); and (2) the State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW). While these agencies have the responsibility for listed and candidate species and critical habitats, responsibility for inspection of all international and domestic passengers and cargo, whether by airplane or ships, lies with the U. S. Department of Agriculture (USDA) and the State Department of Agriculture (HDOA).

Listed below are the agencies concerned with the responsibilities for controlling the introduction of alien species at Kahului Airport.

The majority of the information below was excerpted from the "Topic Group Briefing Papers on Pre-Entry Prevention Activities, Port-Of-Entry Sampling and Inspection, Statewide Amelioration for Selected, Established Pests and Rapid Response Strategies" produced in 1994 as part of the multi-agency Alien Species Action Plan that resulted in the formation of the Coordinating Group of Alien Pest Species (CGAPS) (CGAPS 1994).

The sections below are divided into Pre-Entry, Port of Entry, and Early Detection/Response Categories.

7.2 PRE-ENTRY AND PORT-OF-ENTRY

7.2.1 Federal Agencies

There are seven Federal agencies, as described below, involved to various degrees in the control of alien species introductions into the U.S. at the pre-entry and port-of-entry level.

7.2.1.1 U.S. Department of State

The U.S. Department of State is responsible for negotiation of bilateral treaties between the U.S. and Foreign governments. However, they have no direct responsibilities to provide for the control of alien species but can, if requested, insert alien species control measures into bilateral agreements.

7.2.1.2 U.S. Customs Service

The U.S. Customs Service (Customs) is responsible for clearing imports and collecting duties from all vessels, cargo, and people entering the U.S. from foreign countries. Customs relies on USDA, Animal and Plant Health Inspection Service (APHIS) to develop and maintain lists of prohibited animal, plant, and biological species and products. The U.S. Food and Drug Administration, FWS and HDOA provide additional lists of prohibited items. Customs also preclears flights to Kahului Airport from Canada so arriving passengers are considered as domestic arrivals.

7.2.1.3 U.S. Fish and Wildlife Service - Law Enforcement Division

U.S. Fish and Wildlife Service - Law Enforcement Division (USFWS-LE) has the responsibility for all imports of wildlife or plants into the U.S. from foreign sources. USFWS-LE is responsible for ensuring that all wildlife, plants and related products entering or leaving the U.S. are in compliance with federal and state laws and international treaties, including the U.S. Endangered Species Act, the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Lacey Act.

7.2.1.4 U. S. Department of Agriculture (USDA)- Plant Protection and Quarantine Branch, Animal and Plant Health Inspection Service (APHIS)

USDA Plant Protection and Quarantine (PPQ) is responsible for preventing the introduction of plant pests and diseases into the U.S. PPQ facilitates the export of agricultural commodities to foreign countries through the issuance of phytosanitary certificates in accordance with the international requirements. In addition, PPQ helps prevent the introduction of animal diseases by regulating the importation of animals, animal products, and animal by-products. PPQ also restricts the entry of weeds and their seeds determined to be harmful to U.S. Agriculture.

7.2.1.5 U.S. Postal Service/U.S. Postal Inspection Service

The U.S. Postal Service (USPS) is to provide uniform postal service throughout the nation at reasonable prices. The U.S. Postal Inspection Service (USPIS) is the law enforcement arm of the USPS. Its purpose is to ensure the integrity of USPS, enforce federal statutes, protect the mail, employees and customers of the USPS.

7.2.1.6 Federal Aviation Administration, Airports Division

The FAA Airports Division is responsible for planning and implementing the National Airport System. Based on a grant system, the Airports Division funds planning, design and engineering, and construction at the nations airports in order to maintain an orderly growth and safety at airports.

7.2.1.7 U. S. Public Health Service

U.S. Public Health Service is responsible for insuring that all international passengers entering into the United States meet the public health standards for human disease.

7.2.2 State Agencies

There are six State agencies, as described below, involved to various degrees in the control of alien species introductions into Hawaii at the pre-entry and port-of-entry level.

7.2.2.1 Hawaii Department of Agriculture (HDOA)

The HDOA authority extends to materials coming from the continental U.S., as well as from foreign countries, once the material has cleared USDA. USDA notifies HDOA upon its release of any regulated plants or any nondomestic animal or microorganism.

7.2.2.2 Plant Quarantine Branch, Plant Industry Division, HDOA

The Plant Quarantine Branch (PQ) regulates the importation and movement within the islands of all plants, nondomestic animals (vertebrate and invertebrate) and microorganism. Its primary goal is to prevent the introduction of harmful insects, plant diseases, illegal animals and other pests into Hawaii. PQ also provides clearance for exporting horticultural products from the state (*e.g.*, "rooted plants") and will inspect cut flowers and foliage, and conducts "post-entry" follow-up inspections to ensure that potentially harmful species authorized for entry under HDOA permits do not escape and become established.

7.2.2.3 Inspection and Quarantine Branch, Animal Industry Division, HDOA

By rule, the Inspection and Quarantine Branch (IQB) focuses on cats, dogs and other carnivores; its animal quarantine station places particular emphasis on keeping Hawaii free of rabies. In 1992, this branch was reorganized into two branches - Animal Quarantine Branch and Inspection and Enforcement Branch. This reorganization reflects additional emphasis on enforcement activities.

7.2.2.4 Livestock Disease Control Branch, Animal Industry Division, HDOA

The mission of the Livestock Disease Control Branch (LDC) is prevention, control and eradication of disease of livestock and poultry in Hawaii. Prevention is conducted through disease surveillance activities, which includes enforcing livestock import regulations. These regulations are designed to detect and prevent entry of animals carrying such disease as tuberculosis and anaplamoisis (cattle), pseudorabies (swine), and brucellosis (both cattle and swine). The goal of this program is to ensure that the state remains free of such diseases which in turn makes it easier to export livestock.

7.2.2.5 Inspection and Compliance Branch, Animal Industry Division, HDOA

By rule, the Inspection and Compliance Branch (ICB) focuses on enforcing import regulations and investigating violations of state law and administrative rules relating to animal importation.

7.2.2.6 Department of Transportation, Airports Division

The Airports Division is responsible for the planning, design and engineering, construction, operation, and maintenance of the State Airport System. The Airports Division is responsible to the FAA to ensure the Airport System is operating in a safe manner and consistent with FAA safety orders. The Airports Division is responsible for managing the Airport System under a special revenue fund which is required to break even every year. In other words, the Airport System is funded by their own revenues and not funded by the General Fund of the State of Hawaii.

7.3 EARLY DETECTION/RESPONSE

7.3.1 Federal Agencies

There are two Federal agencies involved with the control of alien species at the early detection/response level.

7.3.1.1 National Park Service

The National Park Service (NPS) manages four national parks in Hawaii in which alien species control is a major program component: Hawaii Volcanoes, Haleakala, Kalaupapa, and Kaloko-Honokohau - a total combined area of about 256,000 acres. Much of the research the NPS conducts on alien species is applicable outside the NPS national park boundaries.

7.3.1.2 U.S. Fish and Wildlife Service

The FWS operates Kealia Wildlife Refuge on Maui and is responsible for the listed and candidate wildlife species within the Refuge.

7.3.2 State Agencies

There are five State agencies involved with the control of alien species at the early detection/response level.

7.3.2.1 Plant Quarantine Branch, Plant Industry Division, HDOA

While the Plant Quarantine Branch (PQ) primarily focuses on preventing the introduction of harmful pests into Hawaii, PQ also conducts "post-entry" follow-up inspections to ensure that potentially harmful species authorize for entry under Hawaii Department of Agriculture permits do not escape and become established.

7.3.2.2 Plant Pest Control Branch, Plant Industry Division, HDOA

The primary mission of the Plant Pest Control Branch (PPC) is to provide favorable environment for agricultural production in Hawaii by limiting plant pest populations that have the potential to cause significant economic damage to Hawaii's agricultural industry. PPC's programs include the control and eradication of insects, mites, mollusks, plant diseases, and noxious weeds using chemical, mechanical or biological measures. PPC has also worked in recent years to lessen farmers' reliance on chemical pest control and encourage greater use of integrated pest management strategies. The branch consists of two sections: Chemical/Mechanical Control (C/M); and Biological Control (BC).

7.3.2.3 Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW)

The Division of Forestry and Wildlife (DOFAW) is responsible for natural resources on roughly 800,000 acres of state-owned land in Hawaii (about one-half of all forestry lands in the state) and game management areas. DOFAW has the dual mandate of protecting native ecosystem and forest resources while also ensuring sustainable hunting of nonnative game animals. Although introductions of new game animals to enhance hunting opportunities were supported during the 1950's and 1960's, DOFAW is now working to control feral mammals in sensitive watersheds and native ecosystem, and manage degraded native or nonnative habitats as sustainable hunting areas.

7.3.2.4 Department of Health, Environmental Health Services Division, Vector Control Branch

The Vector Control Branch (VCB) is charged with preventing insect-borne disease outbreaks and relieving severe urban pest nuisances. VCB responds to public complaints, enforces public health regulations, conducts vector population surveillance, controls pests in the field as well as in and around ports-of-entry, provides public education and consultation services, and conducts research on new methods of pest control.

7.3.2.5 University of Hawaii Cooperative Extension Service

The Cooperative Extension Service (CES) champions informal education for informed decisions and actions through partnerships to improve individual and public well-being.

7.3.3 Private Organizations

There are two major private organizations involved in the control of alien species at the early detection/response level.

7.3.3.1 The Nature Conservancy of Hawaii

The Nature Conservancy of Hawaii (TNCH) has been involved for a number of years in the acquisition of land with special ecological importance for future preservation. TNCH acquires land from private landowners or works with private landowners to preserve land of special ecological importance. In many cases TNCH will hold and manage the land until a federal or state agency can program funding to acquire the land from TNCH.

7.3.3.2 Major Maui Land Owners

Major landowners such as Alexander and Baldwin, Inc. and Maui Land and Pineapple Company also hold lands which have special ecological importance in conservation.

7.4 SUMMARY

The control, inspection and quarantine for the introduction of alien species in the agricultural industry, at the Federal and State government level, goes back over 100 years. The methods, protocols and standards for the control and prevention of agricultural pests are well established and generally effective. However, with the recent concern about the impact of alien species on listed and candidate plant and animal species and their critical habitat, there needs to be additional education, control, inspection, and quarantine procedures for the introduction of alien species. That is, both Federal and State agencies must now be as concerned about the impacts of alien species on listed and candidate plant

and animal species and critical habitats as they are on the impacts of alien species on agricultural commodities.

FWS has the responsibility for enforcing the Endangered Species Act of 1973 for listed and candidate species. The DOFAW has a similar responsibility under Hawaii's Endangered Species Law. USDA has the responsibility for preventing the introduction of plant pests and diseases from international flights. USDA will notify HDOA of any plants/pests which are restricted by the State. At the State level, HDOA has the responsibility to prevent the introduction of harmful insects, plant disease, illegal animals and other alien species into Hawaii.

To increase the effectiveness of interdicting alien species, there needs to be a clear line of responsibility from the Federal and State agencies charged with protecting listed and candidate species and critical habitats. These agencies need the resources, facilities, manpower and funding to perform their mandates. At the Federal level, Senator Daniel Akaka has introduced legislation to clear up a confusing array of federal regulations controlling animals, plants, and diseases that attack the environment in Hawaii.

The USDA and HDOA have the technical background to prevent and control the introduction of alien species, to the maximum extent possible, with adequate personnel and facilities. Presently, HDOA is understaffed at Kahului Airport and the HDOTA will provide facilities to assist HDOA to increase the efficiency of inspections of domestic passengers. When increased numbers of international flights arrive at Kahului Airport, USDA will have sufficient manpower to preform the necessary inspections for alien species, as required, on passengers, cargo, and aircraft. It is the responsibility of HDOTA to furnish support facilities for USDA.

SECTION 8
MITIGATION MEASURES

8.1 INTRODUCTION

In general, measures to minimize and/or eliminate the establishment of alien species in Hawaii and thereby prevent their potential adverse effects on listed and candidate species and critical habitats are applicable to entire taxa rather than to specific species or groups of species. That is, a measure that may minimize potential adverse effects of one alien insect species or alien insect family would also be effective against several alien species or families. Therefore, mitigation measures to minimize and/or eliminate alien species adverse effects can generally be developed to cover a wide range of taxa. In 1996, CGAPS suggested a ten point action plan to minimize alien species introductions in Hawaii (CGAPS 1996). These ten action points are still applicable and in need of further implementation. The measures discussed below generally follow those ten steps and identify means by which those steps could be implemented effectively.

The Biological Assessment Technical (BAT) Panel was asked, at their December 11, 1996 meeting, to discuss and suggest, without reservations, mitigation measures that could effectively intercept alien species inadvertently or purposefully introduced into Hawaii by commercial air travel. Many of the measures suggested at that meeting have been discussed at length by the U.S. Congress Office of Technology Assessment (OTA 1993) and CGAPS (CGAPS 1996). The purpose of discussing possible mitigation measures at the December BAT Panel meeting was to develop those that could be recommended for implementation within this BA and the Kahului Airport Improvements EIS (U.S. Department of Transportation 1996). It is noted that the BAT Panel suggested mitigation measures are not for a specific alien plant or animal species or group of plant or animal species, or for the impacts resulting from the introduction of alien species into Hawaii, but rather are measures by which alien species introductions in general might be controlled or reduced.

For ease of discussion and logic of implementation, the mitigation measures were divided into three broad categories: Pre-Entry, Port-of-Entry, and Early Detection/Response, with the latter limited to the immediate airport environs. Table 8-1 (at the conclusion of this section) lists the mitigation measures suggested by the BAT Panel. Table 8-2, also at the conclusion of this section, identifies the effectiveness of various mitigation measures against selected groups of alien species that might enter Maui and the State of Hawaii. The following is a brief discussion of each of the mitigation measures proposed by the BAT Panel.

8.2 PRE-ENTRY MEASURES

Pre-Entry measures are those that would occur at the originating point of a trip to Hawaii. These measures could take place when a ticket is issued, at the airport prior to boarding, in-flight to Hawaii, or, conceivable, via sovereign government to sovereign

government agreements. Pre-Entry measures could take the form of pretreatment of aircraft, public education programs, interagency agreements, landscaping control, pest free certification programs, limiting flights from high risk areas, prohibiting foreign flights at Kahului Airport, risk assessments of potential pests/points of origin, and baggage inspection at points of origin.

8.2.1 Pre-Treatment

Several countries already require pretreatment of aircraft by pesticides, either by spraying or a residual treatment, before they can operate in that country. For example, in the Pacific, Australia, Fiji, and New Zealand use the residual treatment method. The U.S. Department of Transportation, the World Health Organization, and the International Civil Aviation Organization have called for a ban on spraying aircraft with passengers onboard. The practice of using residual treatment has also been criticized because of possible long lasting adverse effects on passengers and cargo. Because it would take action by the U.S. Congress to allow or require either spraying or residual treatment of passenger areas of aircraft operating in the U.S., pretreatment of aircraft operating on Maui does not appear feasible, although it does appear effective against flying and crawling insects (see Condenast Traveler, October 1996, p. 72).

8.2.2 Education Programs

Note: This discussion also includes updating FWS and HDOA pest lists (including DLNR lists), the CGAPS education program, and maintaining a list of acceptable alien species. Educational programs are perhaps the most cost effective mitigation measures available. Educating the general public, travel agents, airlines and others in the travel and visitor industries can be done fairly easily and effectively. For example, some airlines, such as Delta, show alien species videos on their flights to Hawaii, while others do not. Incentive programs, accompanied by assistance from the Hawaii Visitors and Convention Bureau to assure sensitivity to the traveling public, could persuade all airlines to show the videos. This measure would assure alien species information reaches a greater number of people traveling to Hawaii, as well as airline personnel. The Pacific Area Travel Association (PATA) could be another vehicle encouraging the showing of alien species videos and distributing alien species information on foreign carriers.

CGAPS has performed a vital function in educating the public, with brochures and other publications on the dangers of alien species introductions. Additional funding for continuation of the CGAPS education and brochure programs or transferring this function to another agency should be pursued by all concerned with alien species introductions. Further, periodic alien species education programs for various Federal and State agency staff should be conducted to assure they are kept up to date on which species are considered problematic, as well as new detection procedures, methods and equipment.

8.2.3 Interagency Agreement

Interagency agreements on alien species inspections at foreign airports could be effected with creative incentive programs for the foreign airlines. U.S. designed inspection and training programs could be developed that would greatly reduce the risks of alien species being carried by passengers and aircraft. For example, USDA inspectors in Florida travel to foreign ports for agricultural inspections for fruits, vegetables, and plants destined for Florida. This type of program should be investigated as a possible means to reduce the risks of inadvertent introductions of alien species into Hawaii.

8.2.4 Control Landscaping

The control of landscaping design at foreign airports could also be helpful in decreasing the risks of alien species entering Hawaii. Appropriately selected landscape species, i.e., those that discourage insect habitation, would reduce insect populations in the immediate vicinity of foreign airports. The International Civil Aviation Organization could establish landscape design standards to be followed by all civil aviation authorities. Similarly, the HDOTA should review its landscape design standards as a means to reduce insect harboring plants at State airports. Implementation of this measure could be a cooperative effort with the Hawaii Department of Agriculture (HDOA) as well as the U.S. Department of Agriculture (USDA).

8.2.5 Pest Free Certification For Cargo

Pest free certification programs, i.e., requiring foreign carriers to certify their cargo are free of insects or other pests, could be established on an international basis with the cooperation of the U.S. Departments of State and Transportation. This measure, could be coordinated by the USDA, FWS, and HDOA and may require federal legislation and funding, but should be investigated.

8.2.6 Limit Flights From High Risk Areas

Measures limiting flights into Hawaii for potential alien species from tropical and temperate zones that have been determined to be high risk areas would require action by the U.S. Department of State for foreign flights, and USDA and HDOA for domestic flights. While it is possible to limit introduction of plant and animal species from certain areas on a quarantine basis, it is not presently legally possible to stop airline operations or the movement of passengers into or within the U.S.

8.2.7 Prohibit Foreign Flights at Kahului Airport

The BAT Panel suggested possibly prohibiting foreign flights operating at Kahului Airport. At present, Japan Airlines (JAL) has been granted international landing rights at Kahului Airport on a one stop basis, i.e., JAL must stop at Honolulu International Airport prior to landing at Kahului Airport. Foreign landing rights in the U.S. are under the control

and jurisdiction of the U.S. Department of State and are the result of carefully negotiated bilateral treaties between the U.S. and foreign governments. Federal agencies concerned about alien species introductions into the U.S. should inform the Department of State of these concerns such that they can be considered during the treaty negotiating process.

8.2.8 Risk Assessment

In conjunction with or in place of the mitigation measures suggested under 8.2.6 and 8.2.7, alien species risk assessments for specific countries and airports could be performed prior to the granting of international and/or domestic landing rights at Kahului, Honolulu, or Keahole. These assessments could be similar to those performed now prior to granting permission to introduce new plant and animal species into Honolulu and could be performed by the USDA, FWS, NPS, and HDOA and/or DLNR.

8.2.9 Inspection of All Baggage at Foreign Airports

The inspection of all baggage and cargo for alien species at foreign airports prior to departure could be added to current inspections for other types of contraband. This measure would probably require federal legislation and the cooperation of foreign governments. Agencies responsible for the inspections could be the USDA and FWS, or training of foreign inspectors by these agencies. A high level of confidence in the foreign inspection would be required to avoid further inspections upon arrival in the U.S.

8.2.10 Additional Information on Vancouver Pre-Clearance

All Vancouver, British Columbia, flights are pre-cleared by U.S. Customs for any agricultural material. Because Vancouver has airline hubbing operations, USDA inspectors should be there to assist U.S. Customs. While the passengers are considered low risk for alien species, cargo can be transhipped through Canada without inspection. However, at present, all pre-cleared flights are passenger flights only and no cargo enters Kahului Airport via pre-cleared Vancouver flights. Additional information is needed. HDOA should be included in any pre-clearance agriculture inspections.

8.2.11 Coordination of Federal and State Pre-Clearance Programs

Better coordination of Federal and State pre-clearance programs, such as the integration of data bases, updating FWS and HDOA alien species lists and integration of the DLNR alien species lists and NPS information, should be a high priority of the Federal and State agencies in the control of alien species introductions. Given the apparent State and Congressional political concern regarding alien species introductions, additional funding for this type of action may be obtainable.

8.2.12 Cross Training Between Responsible Agencies

The BAT Panel suggested alien species cross training between USDA, HDOA, FWS and U.S. Customs, such that the personnel from each agency are aware of the procedures and measures used by each to control the introductions of alien species. Cross training would allow each agency to "cover" for the other should it be necessary, as well as assist in the dissemination of alien species information. This measure would also act in concert with the Port-of-Entry airport employee training programs described below in section 8.3.2.

8.2.13 Permits

It was suggested that a more effective permit system could be developed that would aid in the control of the introductions of alien species. This measure would act in concert with the pest free certification measure described previously. The permit system could be implemented by either the USDA or HDOA or both, and require plant and animal importers to undergo more stringent inspections prior to and upon arrival in Hawaii.

8.3 PORT-OF-ENTRY MEASURES

Port-of-Entry measures are those that would be implemented at Kahului, Honolulu, or Keahole International Airports. Additional facilities, equipment and personnel, as well as improved and expanded inspection procedures were suggested by the BAT Panel as possible measures to minimize alien species introductions into Hawaii. The following are brief descriptions of the various measures suggested by the Panel.

8.3.1 Increase Inspection and Quarantine Facilities

Note: this item also includes items 3, 4, and 5 (state-of-the-art cargo building to include USDA/FWS/HDOA/Customs Requirements, improve HDOA domestic inspection facilities, and increase HDOA inspectors/dogs) as discussed at the December 11, 1996 BAT Panel meeting. Increased inspection and quarantine facilities at Kahului Airport as the airport expands was suggested by the Panel as a viable mitigation measure. The HDOTA is committed to furnishing the USDA and HDOA the facilities and equipment required to meet increased passenger and cargo levels projected for Kahului Airport. Included in HDOTA's commitment is a state-of-the-art air cargo building that would include USDA, FWS and HDOA facilities and equipment. The building would be designed per USDA and HDOA requirements for inspections, quarantine and equipment and would be constructed by HDOTA. Therefore, this measure has already been incorporated into the Airport Improvement projects.

Improving HDOA domestic inspection facilities and equipment will improve existing communication data links between the arrival gates and baggage claim facilities, thereby facilitating processing of agricultural declarations. Included in these improvements would be a public address system at the Baggage Claim area to page passengers. Additionally,

increasing the number of golf carts and dog kennels at the airport will be part of the planned improvements.

Another improvement suggested was to increase the number of inspectors and dogs at Kahului Airport. Presently there are seven HDOA inspectors and supervisory personnel and one dog (beagle) at the airport. To cover existing traffic HDOA needs 11 inspectors and supervisory personnel and two dogs. HDOTA currently funds five full time HDOA inspectors for the State Airport System, which includes one at Kahului Airport. The State Legislature in the 1998 Budget deleted HDOTA funding for these inspectors and is providing the funding in the HDOA 1998 Budget. Funding for the additional inspectors and dogs will need to be obtained from other sources.

8.3.2 Training Programs for Airport Employees

Provide education for airport employees for alien species training programs, to allow airport employees to recognize the various alien species. Included in this program should be cross training for applicable employees. This measure should be combined with the Pre-Entry education programs described previously. These programs would be for HDOTA, airline, U.S. Postal Service, and other airport employees and should be coordinated and led by USDA, FWS, HDOA, and possibly the NPS.

8.3.3 Monitor Kahului Airport Environs for Alien Species

Monitoring Kahului Airport environs for alien species was also suggested by the BAT Panel as an early detection mitigation measure. HDOTA will establish a monitoring program at the airport. The program will be developed in consultation with the Bernice Pauahi Bishop Museum staff, and implemented by the USDA Animal Damage Control (ADC) staff and APHIS. ADC are currently under contract to HDOTA for similar services.

8.3.4 Quality Control of Inspection Procedures and Efficiency

It was further suggested by the BAT Panel that USDA and HDOA need to undertake a quality control program of present inspection procedures and efficiency. This would be an extensive inspection program that includes random and non-random sampling of passengers and cargo. Implementation of this program would have to be within legal limits but is an extremely important element for improving the control of the introduction of alien species into Maui and the State..

8.3.5 Establish Data Base

A major problem in describing the alien species problem at airports, and throughout the State, is the lack of a data base on interceptions, types of species, origins of species, and accidental and purposeful introductions. USDA, FWS, and HDOA need to maintain a common data base. This measure could be incorporated into the quality control program described above. In Miami, USDA is establishing a Data Base Program and should be

investigated for applicability at Kahului Airport. The Hawaii Biological Survey at Bishop Museum maintains a database on all native and alien species recorded from Hawaii. Bishop Museum staff are also developing innovative information systems for biological data management. The Bishop Museum staff could assist in the development of the data base.

8.3.6 Scheduling Airline Flights

Scheduling airline flights to maximize inspector's schedules was also suggested as a possible mitigation measure. This measure has been attempted at other U.S. airports without success. Passengers generally want to travel at a time that is convenient to them, not the inspectors, and the airlines try to provide the service their customers want. For foreign flights, many Asian airports have nighttime curfews that limit departure times, and thus control arrival times in Hawaii. The HDOTA has attempted, without success in the past, to have the carriers spread out their arrival times to increase the efficiency of the airports and inspections.

8.3.7 Ban Cargo From High Risk Areas

Banning cargo from tropical and temperate zones that have been determined to be alien species high risk areas was also suggested as a Port-of-Entry mitigation measure. HDOA cannot ban cargo from high risk areas of the U.S. but it can prohibit specific items or species. Similarly, USDA has quarantines on certain products in the U.S. and foreign countries, but neither USDA nor HDOA can ban all cargo from high risk areas. USDA and HDOA could, however, specify packing and handling procedures for cargo.

8.3.8 Alien Species Airport Committee

The establishment of a Kahului Airport Alien Species Committee was also suggested as a possible mitigation measure. The airport presently has a Security Committee with many of the same members necessary for the control of the introduction of alien species. The Security Committee's purview should be increased to include alien species and members added as necessary to carry out this function. HDOTA, USDA, HDOA, ADC, FWS and DLNR personnel are suggested as possible new members to address alien species issues.

8.3.9 Control Landscaping

The Kahului Airport Landscaping design standards should be reviewed to eliminate potential invasive plant species and to be incompatible with alien species. The HDOTA should consult with HDOA, USDA, FWS and NPS to update landscape design standards for all State airports.

8.4 EARLY DETECTION/RESPONSE MEASURES

The early detection/response measures are limited to the airport environs, which are defined as the Airport area north of Hana Highway, west of East Spreckelsville and East of Kahului Harbor, and are primarily under the control of HDOTA. The following briefly describes the measures suggested by the BAT Panel.

8.4.1 Monitoring Surveys to Establish Baseline Conditions

It was suggested that monitoring surveys within the airport environs be conducted to establish baseline alien species conditions. This measure should be accomplished in conjunction with the previously noted monitoring program. Because some of the air cargo containers leave the airport to be unloaded at off-airport sites, off-airport sites should be established as permanent monitoring sites. These monitoring sites should be checked by FWS, or if within Haleakala National Park, by NPS personnel. HDOTA has suggested performing a survey at Keahole-Kona International Airport to determine if alien species are arriving on direct flights from Japan (note, at present JAL operates 3 direct flights per week into Keahole-Kona International Airport, with daily service expected to begin in January 1997). However, this suggestion has been rejected because there is no direct link to Kahului Airport.

8.4.2 Establish Rapid Response Interagency Team

It was suggested that a Rapid Response Interagency Team be established at Kahului Airport to combat known alien species introductions. The team would be under the direction of HDOTA with support and implementation by USDA, HDOA, ADC, FWS, DLNR and NPS. Upon notification of the introduction of an alien species, the team would be mobilized to determine and implement eradication efforts or the best method of either controlling the spread of the species. The team would concentrate on the airport environs first and secondly on the remainder of the island if eradication efforts are unsuccessful. The HDOA has noted that they have only been able to eradicate one alien species in the past.

Additionally, it was suggested a contingency fund, linked to airport activity and user fees be established. However, the FAA has strict rules and regulations regarding any user fees on passengers or cargo. If this measure is to be implemented, it will probably require federal legislation. This measure should be pursued by USDA and FWS in cooperation with FAA.

8.4.3 Establish Contingency Fund Linked to Airport User Fee

The FAA has strict rules and regulations concerning any diversion of airport funds for non-airport activities. Similarly, FAA has strict rules and regulations concerning any user fees on passengers and cargo. If this measure is to be implemented, it would probably require federal legislation. Further, if this measure is to be pursued, in cooperation with

the FAA, USDA and FWS should probably be the primary agencies pursuing the required legislation and implementation measures.

8.4.4 Investigate Eradication

After an infestation of alien species is reported and eradication efforts are implemented, a follow-up program by USDA, HDOA, FWS, and NPS should be conducted to determine the effectiveness of the eradication efforts. As indicated previously, HDOA has stated that in their existence they have only eradicated one alien species. Therefore, it should be assumed that the follow-up investigation will also look at containment.

8.4.5 The Brown Tree Snake Control Plan

The Brown Tree Snake Control Plan, dated June 1996 should be reviewed to determine if the Plan should include (1) Kahului Airport; and (2) expanded to include to Hawaii State Airports and all snakes. Because any snake species becoming established in Hawaii is very likely to cause serious harm, and because monitoring and subsequent control, if necessary would be similar for most problem snakes, Option 2, above is preferred.

8.4.6 Investigate Gaps in Interception of Alien Species

To improve inspection and interception measures, it is extremely important to learn how each new alien species enters the state. Therefore, USDA, HDOA, FWS and other appropriate agencies should collaborate as necessary to conduct a thorough investigation whenever a newly established harmful alien species is found on Maui. The investigation should determine as much as possible on where the gaps in quarantine procedures are, such as, the origin, mode of transportation, mode of entry and mechanisms used by the invading species, as well as whether it was smuggled and the reasons why, and how it escaped detection.

Based on the mitigation measure suggestions provided by the BAT Panel during their December 1996 meeting, as well as those previously recommended by CGAPS and OTA, a recommended program for mitigation is discussed in Section 9, Conclusions and Recommendations.

8.5 EFFECTIVENESS OF MITIGATION MEASURES

In Section 6, Impact of Alien Species, a number of selected alien species were discussed as potential impacts to Maui. In Appendix H, the proposed mitigation measures in this section are discussed for these selected alien species. Table 8-2 lists the proposed mitigation measures and their effectiveness for selected alien species.

TABLE 8-1
PROPOSED MITIGATION MEASURES

Measure	Responsible Agency	Alien Species Group*
Pre-Entry		
1. Pre-Treatment of Aircraft	USDA/Airlines	Effective against flying and crawling insects and arthropods
2. Education of Public on alien Species	HVCB/HDOA/Airlines	Effective against all alien species groups and accidental and purposeful introductions
3. Interagency Agreement on Alien Species Inspection at Foreign Airports	USDA/State Department	Effective against all arthropods and small reptiles
4. Control Landscaping at Foreign Airports	Unknown	Effective against arthropods
5. Pest Free Certification	USDA/HDOA	Effective against arthropods
6. Limit Flights From High Risk Areas	U.S. State Department	Effective against all alien species
7. Prohibit Foreign flights at Kahului Airport	U.S. State Department	Effective against all alien species
8. Risk Assessment of Potential Pests	USDA/HDOA	Effective against all alien species
9. Inspection of All Baggage at Foreign Airports	USDA/FWS	Effective against all alien species
10. Need Additional Information on Vancouver Flights	USDA	Effective against fruit, vegetable, and plant alien species pests
11. Coordination of Federal and State Pre-Clearance Programs	USDA/HDOA	Effective against alien species found on fruits, vegetables, and plants
12. Updating FWS and HDOA Pest List (Including DLNR Lists)	USDA/FWS/HDOA	Effective against all alien species
13. CGAPS Education Program	CGAPS	Effective against all alien species
14. Maintain List of Acceptable Alien Species	USDA/HDOA	Effective against all alien species
15. Program and Education for Government Agencies	USDA/HDOA/FWS/NPS/DLNR	Effective against all alien species

Table 8-1 Continued

Port-of Entry		
1. Increase Inspection and Quarantine Facilities	HDOTA	Effective against all alien species
2. Training Program for Airport Employees to Recognize Alien Species	USDA/FWS/HDOA/Airlines/Others	Effective against all alien species, probably best for arthropods and small reptiles
3. State-of-The-Art Cargo Building to Included USDA/FWS/HDOA/Customs Requirements	HDOTA	Effective against all alien species
4. Improve HDOA Domestic Inspection Facilities	HDOTA	Effective against all alien species on domestic flights
5. Increase HDOA Inspectors/Dogs	HDOA	Effective against all alien species
6. Monitor Kahului Airport Environs for Alien Species	HDOTA/ADC	Effective against all alien species
7. Quality Control of Inspection Procedures and Efficiency	USDA/HDOA	Effective against all alien species
8. Maintain Data Base	USDA/FWS/HDOA	Effective against all alien species
9. Schedule Airline Flights to Maximize Inspector's Schedules	USDA/HDOA/HDOTA/Airlines	Effective against all alien species
10. Ban Foreign Flights	U.S. State Department	Effective against all alien species
11. Ban Cargo From High Risk Areas	USDA/HDOA	Effective against all alien species
12. Dictating Packaging and Cargo Handling Procedures	USDA/HDOA	Effective against all alien species
13. Alien Species Airport Committee	HDOTA/USDA/HDOA/ADC/FWS/DLNR	Effective against all alien species
Early Detection/Response (Limited to Airport Environs)		
1. Monitoring Surveys to Establish Baseline Conditions	HDOTA/HDOA	Effective against all alien species, especially arthropods and plants
2. Establish Rapid Response Interagency Team	HDOTA/USDA/HDOA/ADC/FWS/DLNR/NPS	Effective against all alien species
3. Establish Contingency Fund Linked to Airport Activity or User Charge	USDA/FWS	Effective against all alien species
4. Eradication	USDA/HDOA/FWS/NPS	Effective against all alien species
5. Investigate Breaches in System	USDA/HDOA/FWS/NPS	Effective against all alien species

[1] See Appendix H also.

Acronym Legend:
ADC: Animal Damage Control, Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture
CGAPS: Coordinating Group on Alien Species
FWS: U.S. Fish and Wildlife Service
DLNR: Hawaii Department of Land and Natural Resources
HDOA: Hawaii Department of Agriculture
HDOTA: Hawaii Department of Transportation, Airports Division
NPS: National Park Service
USDA: Plant Protection and Quarantine, APHIS, U.S. Department of Agriculture

TABLE 8-2
EFFECTIVENESS OF MITIGATION MEASURES FOR SELECTED TAXA[1 & 2]

Mitigation Measure/Taxa	Snakes		Birds		Ants		Mingos		Melaleucas	
	Stowaway	Smuggling	Smuggling	Stowaway	Purposeful	Adults	Stowaway	Immature	Purposeful	Inadvertent
Pre-Entry										
1. Pre-Treatment of Aircraft	0	0	0	2	0	3	0	0	0	0
2. Education of Public on Alien Species	1	2	2	1	3	1	2	2	2 + 3	2 + 3
3. Inter-Agency Agreement on Alien Species Inspection at Foreign Airports	2	2	2	3	1	3	2	2	2	1
4. Control Landscaping at Foreign Airports	1	0	0	2	0	2	0	0	0	2
5. Pest Free Certification	2	0	0	2	1	1	3	3	2 + 3	2
6. Limit flights From High Risk Areas	2	0	0	2	0	2	0	0	0	2
7. Prohibit Foreign Flights at Kahului Airport	1	0	0	1 + 2	0 + 1	1 + 2	1	1	0 + 1	1 + 2
8. Risk assessment of Potential Pests	2	2	2	2	2	2	2	2	2	2
9. Inspection of All Baggage at Foreign Airports	0	3	3	0	3	0	2	2	2	1
10. Need Additional Information on Vancouver Flights	0	1 + 2	1 + 2	1	1	2	2	2	1	1
11. Coordination of Federal and State Pre-Clearance Programs	1	2	2	2	2	2	2	2	2	2
12. Updating FWS and HDOA Lists (Including DLNR Lists)	1	2	2	2	2	2	2	2	2	2
13. CGAPS Education Program	2	2	2	2	2	1	2	2	2	2
14. Maintain List of Acceptable Alien Species	2	2	2	1	2	1	1	1	1	1
15. Program and Education for Government Agencies	2	2	2	2	2	2	2	2	2	2

Table 8-2 (Continued)

Mitigation Measures/Taxa	Snakes		Birds	Ants		Midges		Melastomes	
	Stowaway	Smuggling	Smuggling	Stowaway	Purposeful	Stowaway Adults	Stowaway Immature	Purposeful	Inadvertent
Port-of-Entry									
1. Increase Inspection and Quarantine Facilities	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3
2. Training Program for Airport Employees to Recognize Alien Species	3	2	2	2	2	2	2	2	2
3. State-of-the-Art Cargo Building to Include USDA/FWS/HDOA/ Customs Requirements	2	2 + 3	2 + 3	2 + 3	2	2 + 3	2 + 3	2 + 3	1 + 2
4. Improve HDOA Domestic Inspection Facilities	2	2 + 3	2 + 3	2 + 3	2 + 3	2	2 + 3	2	1 + 2
5. Increase HDOA Inspectors/Dogs	3	3	3	1 + 2		0	2	2 + 3	1
6. Monitor Kahului Airport Environs for Alien Species	2	0	0	2	0	1 + 2	1	0	0
7. Quality Control of Inspection Procedures and Efficiency	2	2	2	2	2	2 + 3	2 + 3	2 + 3	2 + 3
8. Maintain Data Base	2	2	2	2	2	2	2 + 3	2	2
9. Schedule Airline Flights to Maximize Inspector's Schedules	2	2	2	2	2	2	2	2	2
10. Ban Foreign Flights	1	0	0	1 + 2	0 + 1	1 + 2	1	0 + 1	1 + 2
11. Ban Cargo From High Risk Areas	2	1	1	2	1	2	1 + 2	0 + 1	1 + 2
12. Dictating Packing and Cargo Handling Practices	3	1	1	2 + 3	1	2	2 + 3	1 + 2	2
13. Alien Species Airport Committee	2	2	2	2	2	2	2	2	2

Table 8-2 (Continued)

Mitigation Measure/Taxa	Snakes		Birds	Ants		Midges		Melastomes	
	Stowaway	Smuggling	Smuggling	Stowaway	Purposeful	Stowaway Adults	Stowaway Immature	Purposeful	Inadvertent
Early Detection/Response (Limited to Airport Environs)									
1. Monitoring Surveys to Establish Baseline Conditions	1	0	0	2 + 3	0	2	0	0	0
2. Establish Rapid Response Interagency Team	3	2 + 3	2 + 3	2 + 3	2	2 + 3	2	2	2
3. Establish Contingency Fund Linked to Airport Activity or User Charge	2	2	2	2	2	2	2	2	2
4. Eradication	3	3	3	3	3	2 + 3	2 + 3	3	3
5. Investigate Breaches in System	3	3	3	3	3	3	3	3	3

[1] Effectiveness Key: 0 = Little Effect; 1 = Somewhat Effective; 2 = Good effectiveness; 3 = Excellent Effectiveness

[2] Source: Table developed by F. W. Howarth, see Appendix II.

SECTION 9
CONCLUSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION

To date, while no scientifically controlled studies have implicated the Proposed Project as a reason for a potential increase in the rate and/or number of alien species introduced into Maui, it can intuitively be recognized that alien species, except for natural dispersal, can only arrive in the Hawaiian Islands by ship or airplane. As indicated in Section 1, an opinion survey, from 1986 data, of State Agriculture Inspectors taken for the 15th legislature, 1989 Regular Session, *perceived* domestic airlines passengers were the responsible pathways for 27 percent of the introductions of Insect Pests and Illegal Animals in Hawaii, followed by First Class Mail, 23 percent and cargo (both ship and air) 18 percent (OTA 1993). It should be understood that the survey pertained to aircraft flights to Hawaii in 1986 (OTA 1993). In the same publication, OTA charts 205 non-indigenous species introduced into the United States, and only in one case could an introduction be attributed to an aircraft.

However, if the present aircraft flights are one of the pathways for alien species introduction into Hawaii, and if the Proposed Project results in more direct flights to Maui from the mainland U.S. and, in the future, from Asia, the Proposed Project could potentially increase the risk of alien species being introduced.

It is the conclusion of the FAA and HDOTA that alien species introductions resulting from existing air and ship travel, the shipment of cargo by air and sea, and with natural dispersion, will continue to have an impact on the listed and candidate species on Maui.

The mitigation measures proposed in connection with this BA are intended to supplement the measures set forth and discussed in connection with the Draft EIS (U.S. Department of Transportation 1996). In addition, these measures do not change the conclusion of the Draft EIS with respect to the impact of the Proposed Project on the introduction rate of alien species into Maui or the State of Hawaii. In addition, these measures will not result in any significant effects not discussed in the Draft EIS. HDOTA will assist the Federal and State agencies by implementing the mitigation measures listed below as part of the Proposed Project.

Because no one can predict which alien species might be introduced into Maui and/or Hawaii due to the Proposed Project or what the impacts of those alien species may have on listed or candidate species or critical habitats, the FAA and HDOTA have determined that generalized mitigation measures to eliminate or minimize potential adverse effects of alien species introductions and impacts would be the most effective measures to take.

The proposed mitigation measures will reduce the increased risk of alien species due to the Proposed Project to the maximum extent possible, and mitigate the present rate of alien species arriving on domestic flights. These mitigation measures have been determined to be related to the Proposed Project and the processing of passengers at Kahului Airport. Other complimentary mitigation measures (see Section 8) have been determined to be infeasible and outside the control and function of the HDOTA and the FAA.

The FAA and HDOTA agree that the mitigation measures that can be undertaken are in support of the Federal and State government agencies responsible for inspection for alien species at the airport; HDOA is responsible for inspection of alien species on domestic arrivals; and the USDA is responsible for inspection of alien species on international flights. HDOTA will furnish facilities, equipment, and technical support at the State Airports to assist the HDOA, USDA and other State and Federal agencies in the conduct of their responsibilities in regard to controlling alien species introduction.

9.2 PRE-ENTRY MEASURES

Pre-entry mitigation measures will have varying degrees of effectiveness against alien species of arthropods, reptiles, birds, and melastomes.

- HDOTA, as a member of CGAPS, will keep CGAPS informed of any new proposed domestic or international routes to Maui, so that HDOA, USDA, NPS and FWS can inform the appropriate State and Federal Authorities of their concerns.
- HDOTA will support CGAPS in their educational role of informing the traveling public of the dangers of alien species, particularly in promoting the Alien Species Video for inflight viewing.

9.3 PORT-OF-ENTRY MEASURES

The effectiveness of port-of-entry mitigation measures will be "somewhat effective" against alien species of arthropods, reptiles, birds, and melastomes. These measures will be more effective than pre-entry measures, in part because they can be implemented and controlled locally.

- HDOTA will support, subject to the availability and approval of airport funds, Hawaii Department of Agriculture (HDOA), Domestic Arrival Inspection by:
  - Installing a data link between the arrival gate and baggage claim.
  - Installing one X-Ray Machine to test the feasibility for inspecting arriving baggage.
  - Installing a public address system at baggage claims to page passengers.

- Supplying additional office space, kennels and inter-terminal carts, as necessary for the processing of passengers. The facilities should be adequate to provide for one supervisor, eleven inspectors and two dog kennels. Provision for expansion of HDOA staff to accommodate future passenger growth will be made.

- HDOTA will design and construct a new state-of-the-art air cargo building to meet existing and forecast demands, subject to the availability and approval of airport funds, which will include:

  - Positive air pressure control facilities for inspections of air cargo containers.

  - Office and facilities for U.S. Customs, USDA and HDOA; including a joint USDA/HDOA Laboratory, walk in freezer, incineration facilities, and provision for X-Ray of cargo containers.

  - Provide computer facilities for an alien species database system.

In addition to the above, the HDOTA will, to the extent possible, given funding and personnel resources limitations, implement the following mitigation measures:

- HDOTA will encourage the Kahului Airport Security Committee to include alien species control as an element under its purview.

- HDOTA will conduct alien species training classes for the maintenance, airline and other airport employees.

- HDOTA will encourage USDA Animal Damage Control (ADC) to conduct periodic surveys of Kahului Airport environs for alien species.

- HDOTA will review the existing landscaping at Kahului Airport to reduce its viability as habitat for alien species.

9.4 EARLY DETECTION/RESPONSE MEASURES

The effectiveness of early detection/response mitigation measures will be similar to the port-of-entry measures because they are implemented and controlled locally.

- Brown Tree Snake - HDOTA will review the Brown Tree Snake Control Plan, dated June 1996, to determine if it is applicable to (1) Kahului Airport; and (2) other Hawaii State Airports, and to all snakes.

9.5 OTHER MITIGATION MEASURES

During the course of the development of this BA and meetings with the BAT Panel, a number of other mitigation measures were identified that could possibly be implemented

(see Section 8). However, these measures are clearly the responsibility of other State and Federal agencies. These measures are listed below:

9.5.1 Pre-Entry

Education Program - The prevention education program started by CGAPS should continue in cooperation with HVCB. The education program will help in preventing accidental introduction of alien species by uninformed airline passengers. The education program(s) should be coordinated by CGAPS and implemented by USDA, FWS, NPS, HDOA, and DLNR.

9.5.2 Port-of-Entry

A Data Management System - A data management system which would include HDOA, USDA, FWS and NPS is important to the inspection and control of alien species entry at the State Airports.

Quality Control - A quality control program to test the effectiveness of current and proposed inspection and mitigation measures should be implemented by USDA and HDOA.

The Proposed Project and ongoing aircraft operations, with implementation of the proposed mitigation actions at Kahului Airport will reduce the risk of introduction of alien species on and the impact on listed and candidate species and their habitats on Maui.

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APPENDIX A

LIST OF INTRODUCED SPECIES IN HAWAII REPORTED IN 1990-1994 BY DR. GRANT K. UCHIDA HAWAII DEPARTMENT OF AGRICULTURE

BENJAMIN J. CAYETANO
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JAMES J. NAKATANI
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October 18, 1996

Mr. David J. Welhouse
Airport Planner
Federal Aviation Administration
Honolulu Airports District Office
'rince Jonah Kuhio Kalanianaole Bld.
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Dear Dave,

Thank you for all of your helpful advice, which was helpful in planning my talk for 17 October 1996. I found the discussions by the Biological Assessment Technical Advisory Panel to be very stimulating. As I promised, enclosed is a copy of a list of alien species with country of origin data. I feel that this list will be useful to your advisory panel members.

Sincerely,

Grant K. Uchida

LIST OF INTRODUCED SPECIES IN HAWAII, REPORTED IN 1990-1994

by Dr. Grant K. Uchida
Hawaii Department of Agriculture Entomologist, Maui

Cybocephalus nipponicus Endrody-Younga.
"A minute predatory beetle."
Origin unknown.
First collected on Maui, 1989.

Paratettix mexicanus (Saussure).
"A tetrigid grasshopper."
Origin unknown.
First collected on Kauai, 1987.

Microcanthia humilis (Say).
"A shore bug."
Origin unknown.
First collected on Oahu, 1988.

Solenopsis papuana Emery.
"An ant."
Known from New Guinea, eastern Melanesia, Fiji, and Samoa.
First collected on Oahu and Maui, 1967.

Trichoplusia sp. prob. *diatraeae* Cherian & Margabandhu.
"A noctuid moth parasite."
Known from India, Burma, south China, Sri Lanka, Mauritius, Papua-New Guinea, and the Soloman Islands.
First collected on Oahu, 1990.

Eriophyes hibisci Nalepa.
Hibiscus erineum mite.
Known from Brazil and Tonga.
First collected on Oahu, 1989.

Aleurothrixus antidesmae Takahashi.
"A whitefly."
Known from Taiwan and the Philippines.
First collected on Oahu, 1988.

Scymnus (Pullus) horni Gorham.
"A lady beetle."
Known from southwestern U.S. and northern Mexico.
First collected on Oahu, 1990.

Acanthoscelides macrophthalmus (Schaeffer).
"A bean weevil."
Known from Texas, Florida and Hondurus.
First collected on Oahu, 1990.

Trentepohlia (Hongoma) australagiae Skuse.
"A tipulid fly."
Known from Australia, New Guinea, and Soloman Islands.
First collected on Oahu.

Eutrichosomella Girault.
"An aphelinid wasp."
Origin unknown.
First collected on Oahu, 1985.

Phenacoccus parvus Morrison.
"A mealybug."
Known from the Galapagos Islands, from Western Samoa to New Calidonia and Vanuatu, and West Africa.
First collected on Oahu, 1991.

Diversinervus cervantesi (Girault).
"A green scale wasp."
Known from Australia, Israel, Malaysia, and Samoa.
First discovered on Kauai, 1991.

Siphoninus phillyreae (Haliday).
Ash whitefly.
Origin unknown.
First discovered on Oahu, 1991.

Aphelinus sp. poss. *humilis* Mercet.
"An aphelinid wasp."
Known from Europe and India.
First discovered on Oahu, 1991.

Hayhurstia atriplicis (L.).
"An aphid."
Origin unknown.
First discovered on Oahu, 1991.

Rhopalosiphoninus latysiphon Davidson.
"An aphid."
Origin unknown.
First discovered on Oahu, 1991.

Aleurochelus sp.
"A whitefly."
Known from Florida and Dominican Republic.
First collected on Maui, 1991.

Mycodiplosis fungicola (Felt).
"A plumeria rust midge."
Known from Brazil, Jamaica, and St. Vincent in the Caribbean.
First discovered on Oahu, 1991.

Dixa longistyla Takahashi.
"A dixid fly."
Origin unknown.
First discovered on Oahu, 1991.

Psydrothrips n. sp.
"A thrips."
Origin unknown.
First discovered on Oahu, 1991.

Phymastichus n. sp.
"A eulophid wasp."
Origin unknown.
First discovered on Hawaii Island.

Encarsia inaron (Walker).
"Ash white fly parasite."
Origin unknown.
First discovered on Oahu, 1992.

Johnsonia elegans Coquilett.
"A sarcophagid fly."
Known from Florida and Mexico.
First discovered on Oahu, 1992.

Lixus mastersi (Pascoe).
"A weevil."
Origin unknown.
First discovered on Oahu, 1989.

Stelidota sp.
"A nitidulid beetle."
Origin unknown.
First discovered on Oahu, 1992.

Cycloneda sanguinea (L.).
"A lady beetle."
Origin unknown.
First discovered on Oahu, 1992.

Pagria signata (Motschulsky).
"A leaf beetle."
Known from India through SE Asia, southern and northern China, to Indonesia, Philippines, Taiwan, Ryukyu Islands, Japan, the Bonin Islands, and Guam.
First collected on Oahu, 1981

Draeculacaphala inscripta Van Duzee.
"A watercress leafhopper."
Origin unknown.
First discovered on Oahu, 1992.

Pachyneuron sp.
"A coccinellid parasite."
Origin unknown.
First discovered on Hawaii Island, 1991.

"A yellow shelled snail."
Origin unknown.
First discovered on Oahu, 1992.

Hippelates proboscideus Williston.
"An eye gnat."
Known from Central America and Caribbean.
First discovered on Oahu, 1992.

Poecilominettia sexseriata Hendel.
"A lauxaniid fly."
Known from Paraguay, Bolivia, and Panama.
First discovered on Oahu and Kauai.

Colpodes buchannani Hope.
"A carabid beetle."
Known from India to Indonesia and Philippines, extending north to Japan.
First collected on Oahu, 1991

Aleurotrachelus sp.
"A whitefly."
Known from Tropical America.
First discovered on Hawaii Island, 1992.

"A mealybug."
Origin unknown.
First discovered on Oahu, 1992.

Greenida formasana (Maki).
"A guava aphid."
Known from India, Bangladesh, Nepal, China, Japan, Taiwan, Ryukyu Islands, Philippines, and Indonesia.
First discovered on Oahu, 1993.

Ctenarytaina eucalypti (Maskell).
Bluegum psyllid.
Known from Australia, New Zealand, New Guinea, South Africa, Britain, and California.
First discovered on Maui, 1993.

Blastopsylla occidentalis Taylor.
"A eucalyptus psyllid."
Known from Australia, New Zealand, and California.
First discovered on Kauai, 1993.

Clastoptera xanthocephala Germar.
"A spittle bug."
Known from the Caribbean and southern U.S.
First discovered on Oahu, 1992.

Aspidiella sacchari (Cockerell).
"An armoured scale."
Known from Florida, Caribbean Islands, Venezuela, Guyana, Mauritius, Kenya, and Sri Lanka.
First discovered on Oahu, 1993.

Aleuroclava jasmini (Takahashi).
" A jasmine whitefly."
Known from India, Thailand, Sumatra, Malaya, Singapore, Philippines, Hong Kong, People's Republic of China, Taiwan, and Guam.
First discovered on Oahu, 1993.

Encarsia lutea Masi.
"A white fly parasite."
Origin unknown.
First discovered on Molokai, 1992.

Rhizoecus hibici Kawai and Tagaki.
"A mealybug."
Origin unknown.
First discovered on Hawaii Island, 1993.

Encarsia strenua (Silvestri).
"A Kirkaldy whitefly parasite."
Origin unknown.
First discovered on Hawaii Island, 1993.

Disclisioprocta stellata (Guenee).
"A bougainvillea caterpillar."
Origin unknown.
Nova Scotia, Bermuda, Florida, and Maine.
First collected on Oahu, 1993.

Capitophorus hippophaes (Walker).
"An aphid."
Origin unknown.
First discovered on Oahu, 1993.

Hypera postica (Gyllenhal).
Alfalfa weevil.
Origin unknown.
First discovered on Hawaii Island, 1994.

Coelaspidia sp.
"An encyrtid wasp."
Origin unknown.
First discovered on Oahu, 1993.

Zeteticontus sp.
"An encyrtid wasp."
Origin unknown.
First discovered on Oahu, 1994.

Tetrastichus sp.
"A coccinellid wasp."
Origin unknown.
First discovered on Molokai.

Cassida circumdata Herbst.
"A tortoise beetle."
Known from Greater New Guinea and the Soloman Islands.
First discovered on Oahu, 1994.

Evorinea sp.
"A dermestid beetle."
Origin unknown.
First collected on Hawaii Island, 1993.

Rhizoecus cacticans (Hambleton).
"A root mealybug."
Known from South America, Central America, California, Australia, and England.
First collected on Oahu, 1994.

Fiorinia proboscidaria Green.
"A citrus scale."
Known from Fiji, French Polynesia, Tonga, Sri Lanka, India, Taiwan, Ryukyu Islands, and Southern Asia.
First discovered on Oahu, 1994.

Pelastoneurus sp.
"A dolichopodid fly."
Known throughout North, Central, and South Americas, Africa, and Southeast Asia.
First discovered on Oahu, 1994.

Necrosia sp.
"A walking stick."
Origin unknown.
First discovered on Hawaii Island.

Coridromius variegatus (Montrouzier).
"A mirid bug."
Known from Australia.
First discovered on Hawaii Island, 1991.

Lepisiota sp.
"An ant."
Origin unknown.
First discovered on Oahu.

Tetranychus evansi Baker and Pritchard.
"A solanaceous spider mite."
Known from Mauritius island, Brazil, Texas, and California.
First discovered on Oahu.

APPENDIX B

MEMBERS OF BIOLOGICAL ASSESSMENT TECHNICAL PANEL

APPENDIX B
MEMBERS OF BIOLOGICAL ASSESSMENT TECHNICAL PANEL

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APPENDIX C

THE THREAT OF ALIEN SPECIES TO NATURAL AREAS OF MAUI: WHY IS MAUI SO SPECIAL AND WHAT ARE THE THREATS?

PREPARED OCTOBER 17, 1996
BY

DR. LLOYD L. LOOPE, USDI USGS,
BIOLOGICAL RESEARCH DIVISION
HALEAKALA NATIONAL PARK FIELD STATION
MAUI, HAWAII

THE THREAT OF ALIEN SPECIES TO NATURAL AREAS ON MAUI: WHY IS MAUI SO SPECIAL AND WHAT ARE THE THREATS?

A briefing statement prepared for the Kahului Airport Biological Assessment Committee for their site visit on October 17, 1996

by Lloyd L. Loope, USDI, USGS, Biological Research Division, Haleakala National Park Field Station, Maui, Hawaii

ALIEN SPECIES: A WORLDWIDE PROBLEM, BUT ONE WHICH IS MUCH MORE SEVERE IN HAWAII

Alien species are becoming increasingly recognized as a threat to biological diversity and human welfare worldwide, not just on islands. A gathering of 80 countries at a United Nations Conference in mid-1996 produced the following conclusion: "Invasive species were identified as a serious global threat to biological diversity, and in some countries the most important threat. Such species threaten the natural and productive systems which they invade and in many cases cause disruption of ecological systems, homogenisation of biota and extinctions. This has often resulted in significant environmental, economic, health, and social problems, imposing costs in the billions of dollars and seriously affecting a large number of people."

Oceanic island ecosystems in general and the Hawaiian Islands in particular are highly susceptible to damages caused by humans and the alien plants and animals they bring with them. Because of their evolution in relative isolation and in the absence of many forces shaping continental organisms, ecosystems of the Hawaiian Islands are particularly vulnerable to invasion by alien species from continents. More native species have been eliminated in Hawaii than anywhere else in the United States and most places in the world. Although habitat destruction has been an important cause of extinction and endangerment, the introduction of alien species has contributed in a major way in the past and is now the predominant cause of biodiversity loss in Hawaii.

WHAT IS SO SPECIAL BIOLOGICALLY ABOUT HAWAII?

The story of how Hawaii's biota came to be is astonishingly simple, yet profound, and relates to the special vulnerability of the islands to pests. The relatively few animals and plants that reached Hawaii prior to human influence over thousands of miles of open ocean on the winds, floating, or attached to storm-driven birds arrived in remarkably diverse potential habitat. Approximately 10,000-12,000 species of land-dwelling animals and plants of Hawaii, most of them endemic, are believed to have evolved in nearly complete isolation from roughly 2,000 ancestors that arrived on the islands by chance over 70 million years. It

follows that the rate of successful colonization over geologic time was about once every 35,000 years.

Some of Hawaii's successful ancestral colonizing species are the sources of the most spectacular evolutionary adaptive radiation known in the world -- for example, the Hawaiian honeycreepers, the vinegar flies, and the silversword alliance. The Galapagos Islands have gained considerable fame from Charles Darwin's observations of classic radiations among the island group's animals during his 1832 visit -- observations which led to the birth of Darwin's theory of evolution. Native animals and plants of the Hawaiian Islands, however, have had much longer evolution in isolation and a much greater variety of habitats to occupy. The animals and plants of these islands are an important part of Hawaii's, America's, and of the world's natural heritage, and comprise an extremely valuable natural resource. They hold back the soil from washing into the sea, and provide for gradual release of runoff water. They are also inseparable from the beauty and wonder of Hawaii.

HAWAII'S BIOLOGICAL DIVERSITY CRISIS, EFFORTS TO COPE WITH IT, AND WHAT IS SPECIAL ABOUT THE ISLAND OF MAUI

Managers of Hawaii's protected areas for ecosystem conservation (primarily National Parks and Wildlife Refuges, State Natural Area Reserves, and private reserves) are now realizing that although active on-site vigilance and management are essential, long-term protection of these areas may depend more than anything else on the success of keeping new alien plant and animal species from becoming established on an island-wide level. It is apparent that many aggressive plant and animal species not yet established in Hawaii can, if introduced, exploit and modify habitats not yet threatened by any established alien species. There is a realization that unless combatted with ingenuity and commitment, the insidious threat of alien species can be expected to proliferate and inundate all but the most resistant native ecosystems in protected areas of Hawaii. And in view of the difficulty and expense of controlling invasive species after they are established (many can't be controlled), preventing establishment of new introductions appears not only cost effective, but essential. Federal and state managers of protected areas in Hawaii are struggling, with some success, to cope with reducing the impacts of alien species on the native biota in order to prevent further loss of biodiversity and ecosystem degradation, but they are spread thin and successes are recognized as being only temporary, given continued invasion. And control is not only expensive, but in many cases ineffective.

By any standard, however, efforts to protect biodiversity and ecosystem integrity are progressing far better on Maui than on any other major Hawaiian island. Reasons for this are complex,

but important factors include fortuitous survival of outstanding resources until the present (partly due to limited penetration of high-altitude sites by roads and human-habitation), a highly supportive public (including the Hawaiian community) and press, excellent effort exerted by key landowners/ managers, and exceptional interagency cooperation.

Recent community-supported efforts involving alien species include 1) the fight against the aggressive weed tree Miconia calvescens (with funding from Maui County, with support from the Council and Mayor); (2) removal of feral pigs from remote areas to protect watersheds and biological diversity; and (3) eradication in 1990-91 of a rabbit population which had exploded from pet releases within Haleakala National Park, accompanied and followed by citizen surveillance (in the form of citizen phone calls from all over the island) for incipient rabbit outbreaks. Community action, while commendable, obviously has its limits in stemming the tide of invasions, however.

The greater part of the higher elevation ecosystems (above 2,500-3,000 ft elevation) of both East and West Maui are receiving active ecosystem management and are important reservoirs for biodiversity. Haleakala National Park, an international Biosphere Reserve, is afforded special legal protection by federal laws and can justifiably claim that it is among the most important reserve sites in the United States for conservation of biodiversity. However, other reserves (e.g. Waikamoi, Hanawi, Kapunakea, Pu'u Kukui) on East and West Maui, although lacking comparably stringent legislation, are of comparable biological importance and complement the Park's role in ecosystem protection.

As a result of Maui's surviving diverse, relatively intact ecosystems, it has much more to lose from new alien species introductions.

A paramount point perhaps not widely appreciated is that whereas Endangered species receive the most publicity and legal protection, it is the species not yet "endangered," but just as vulnerable to effects of alien species, that predominate in the ecosystem and contribute the most toward biodiversity and ecosystem functioning. If alien species continue to pour into Maui, damage to already listed endangered species will be just the tip of the iceberg for damage to biodiversity and ecosystem functioning. The concept that the already named Endangered species can serve as a meaningful surrogate for the ecosystem as a whole has some validity. However, preventative and/or control measures aimed exclusively at species given special legal status on Maui would be inappropriately limited and likely would result in inadequate protection for Maui's native ecosystems. For example, allowance must be made for insects and other invertebrates, none of which have yet been listed for Maui (though many are under consideration for listing), but which

comprise roughly 75% of Maui's endemic species and are crucial in ecosystem functioning.

ARE THE ENVIRONS OF KAHULUI AIRPORT REALLY MORE HOSPITABLE TO ALIEN SPECIES?

You be the judge. I feel that a strong, perhaps irrefutable, case can be made that arriving alien species at OGG are more likely to establish than at HNL because of two factors. First, the relationship of HNL to prevailing tradewinds tend to blow alien insects out to sea. At OGG, the tradewinds tend to carry alien insects into the lush agricultural area of the isthmus and up into the mountains. (Average wind speed at OGG is only 18% greater than HNL; this difference may or may not be important). Second, the environment around HNL is less biologically hospitable, due to vast expanses of concrete, within and outside the airport complex. The Kahului Airport is surrounded by irrigated sugar cane fields, by wetlands (Kanaha Pond), and by beach/dune vegetation.

MAUI'S HABITATS

There is a favorable physical climate somewhere on Maui to suit the great majority of the world's 1.7 million+ described species of plants and animals. Mean annual temperature on Maui ranges from about 78°F at Kahului to about 47°F at the summit of Haleakala volcano. Snow occurs occasionally on Haleakala, down to an elevation of about 8,000 ft. Frost occurs down to 4,000 ft during the coldest winter nights. Anyway, many species which are native to a place where winters are cold manage to do just fine without the cold winters. Mean annual rainfall ranges from less than 10 inches at Kihei and Lahaina to about 400 inches at 5,000-6,000 ft elevation on parts of both East and West Maui.

WHAT ALIEN SPECIES ARE WE PARTICULARLY WORRIED ABOUT?

The problem is twofold: inadvertant introductions in planes and associated cargo; and deliberate "smuggling." As Larry Nakahara of HDOA has so well articulated, it is frankly impossible to know which species we should be most worried about among arrivals at Kahului Airport, since we know that we will be surprised. Nevertheless, here is a shot at it.

SNAKES: The danger from the brown tree snake is well known, but many snakes are generalized predators. It is likely that dozens (or perhaps even hundreds) of species of the ca. 3000 species of snakes known worldwide could cause equally devastating problems for biodiversity if they became established on a Hawaiian island.

Snakes are becoming quite popular as pets, and the enterprising pet trade is making many species available, legally or illegally. Snakes are banned from Hawai, but more than a few types of snakes are already turned up here. How do they get to Hawaii? The U.S. Mail is certainly an avenue, but so is baggage and hand carried luggage. If the brown tree snake (or an ecologically similar snake species) became established on Maui, we assume that it would eventually become established throughout rain forests and eliminate not just endangered bird species, but most native bird species.

OTHER VERTEBRATES: These can include mammals, birds, reptiles, or amphibians. The Jackson's chameleon, native to East Africa and introduced to the Hawaiian Islands illegally, is well established on Maui and may pose an eventual threat to forest birds through competition for invertebrate prey in high-elevation rain forests. A Virginia opossum (not generally considered a cuddly animal by human inhabitants in its native range) was recently found near Honolulu International Airport. How did it get there and what other vertebrates are being transported? The potential for smuggling in exotic "pets" is seemingly endless. The Virginia opossum example raises the spectre of further surprises we don't anticipate. The brush-tailed possum (Trichosurus vulpecula), rarely seen in its native Australia, has exploded in numbers after its introduction to New Zealand. It is omnivorous; one plant genus it devours in New Zealand is Metrosideros, the dominant tree (Metrosideros polymorpha) in Hawaii's forests. It also transmits bovine tuberculosis to cattle and humans.

INVERTEBRATES IN GENERAL: Many existing and potential alien invertebrates feed directly on native plants, affecting their survival and that of associated native faunas.

SLUGS AND SNAILS: Slugs have become widespread agricultural pests in Hawaii and may pose a major, but little-recognized threat to native plant species. The presence of a common garden slug, Milax gagates, has been noted on greensword (Argyroxiphium gravanum) in with a remote high-elevation rainforest area of East Maui. Slug predation has been observed to damage several rare plant species of Maui including Ranunculus mauiensis (a "species of special concern"), several lobelioids, and the endangered Schiedea haleakalensis. Perhaps there are worse slug invaders. There is a new one on Oahu (with a line down its back) now which is extremely destructive to native lobelias. Plant-eating snails are also potential invaders.

MOSQUITOS: Aircraft fuselages are notorious for transporting mosquitos, some of which can pose serious health threats to humans. Others can pose severe health threats to birds. If a mosquito were to arrive which could transport avian malaria and/or pox to higher elevations than can current mosquito species (Culex quinquefasciatus), three to five species of Hawaiian

honeycreepers could be driven to extinction on Maui.

ANTS: Worldwide, predacious ants are a powerful ecological force. Whereas ants are virtually ubiquitous on continents, the Hawaiian Islands lack native ants; as a result, the native insect fauna, including pollinators of native plants, is highly vulnerable to ant invasion. Although 40+ species of alien ants are already established in the Hawaiian Islands, many Maui habitats (especially rain forests and high-elevation sites) still lack ants and therefore still possess a reasonably intact native insect fauna. Unfortuantely, there are undoubtedly species of ants somewhere in the world which could thrive in Maui habitats as yet unexploited by ants.

TERMITES: Not only could new alien termites pose tremendous threats to the built human environment, but impact of certain termite species on native woody plants could prove devastating; alien termites could also drastically alter nutrient cycling.

LEAFHOPPERS: The two-spotted leafhopper (Sophonia rufifascia) was a "surprise" from China, first noted in Hawaii in 1987. Since then, this leafhopper has been found in association with many plant species exhibiting such symptoms as chlorosis, leaf distortion, stunting, and death. The most dramatic effect noted has been the phenomenon of "uluhe dieback," where monospecific stands of the fern Dicranopteris linearis have died. S. rufifascia damage has been recorded on 221 plant species (31 natives) in 69 plant families in Hawaii. The damage to vegetation on Maui has been locally severe, but mostly at elevations below 2000 ft. It is not only a threat to biodiversity, but also to the cut flower industry. Other surprises may lurk in this insect group.

BEETLES: The black twig borer (Xylosandrus compactus) has been observed to cause severe damage to numerous native tree and shrub species in Hawaii, including many rare species. Beetles are a very diverse group which undoubtedly include many other potentially invasive species which could thrive on Maui.

BEES, WASPS, AND OTHER ALIEN POLLINATORS: One of these could produce a surprise through pollinating an alien plant and triggering a population explosion of the plant. An example of a potentially invasive alien plant already present on Maui but lacking a pollinator may be kudzu (Pueraria lobata). Pollinator and bird seed dispersal examples are part of a general phenomenon -- the tendency of proliferating alien species to facilitate the invasiveness of one another.

VESPID WASPS: The aggressively predacious western yellowjacket (Vespula pensylvanica) has the potential for severe impoverishment of the native arthropod fauna in almost all except the wettest habitats in Maui. This recently established (1978)

ground-nesting vespid wasp produces overwintering colonies which sometimes exhibit huge numbers of workers that forage for protein to feed larval workers, queens and males. Workers from a single large colony of 40,000 workers may take on the order of 40 million prey items in a 3-week period. Other invasive vespid wasps and hornets are problematic elsewhere and obvious potential invaders of Hawaii; in New Zealand, foraging of alien *Vespula germanica* and *Vespula vulgaris* displaces native forest birds by pre-empting the honeydew resource of the southern beech forests.

OTHER GROUPS OF NO LESS CONCERN: Weeds, smuggled or as seeds on boots or equipment; birds; plant and bird diseases; ticks, chiggers, biting flies; predacious spiders; fishes; seaweeds. This list is by no means exhaustive.

APPENDIX D

LIPSEY & ASSOCIATES, INC.
TRIP REPORT
HALEAKALA NATIONAL PARK

LIPSEY & ASSOCIATES, INC.

1400 Prudential Drive, Suite 7
Jacksonville, FL 32207
(904) 398-2168
Fax # 398-5477

September 26, 1996

Mr. Jim G. Dittmar
Edward K. Noda and Associates
615 Kiikoi Street
Honolulu HI 96814-3116

Dear Mr. Dittmar:

I enjoyed meeting you and Brian Ishii at the meeting last week. Brainstorming with other scientist on this very important project will be very productive.

I had a nice meeting with Dr. Francis Howarth from the Bishop Museum and spent the day with Ron Nagata, the acting superintendent of Haleakala National Park on Friday 9/20/96. Ron Nagata, who heads an impressive team of researchers at HNP; represented Don Reeser at the BAAC meeting. Ron had his team of experts meet with me when I arrived at HNP to give me a overview of their work with endangered species, predator control, ferral animal control and alien species control. Their entire budget from HNP is only 2.5 million a year of which $750,000.00 a year goes to Resources Management, Mr. Nagata's area. His budget should be $2.5 million according to the Management Action Plan that identified the needs of HNP. He only has nine NPS staff and six other people for a total of 15 people, when actually the map calls for thirty-six FTE's. Their primary concern involves the potential impact of the runway extension on their programs at HNP and they fear that an alien species will spread to HNP and they will not have the money or the manpower to respond. They have assigned three and a half people for endangered species and predator control (mongoose, rats, cats, dogs, goats, pigs and Axis deer). They use three people on vegetation control. They used four people on ferral animal control, mostly to inspect fences, run trap lines, and destroy alien plants.

HNP has 352 alien species but they are actually working on only 100 species actively, including Australian tree fern, strawberry guava; eucalyptus; and alien grasses. The endanger mammals include the hoary bat and the Hawaiian monk seal. Barb wire fences have killed at least two hoary bats. The dark rumped petrel is being threatened by invasion from cats and mongoose which they trap. The Nene goose, which they have 250 left in the park, is a stable population but is a result of the 500 geese that were reintroduced earlier and survived mongoose and rat predation. Wild pigs continue to root around the park which spreads alien weed seeds; allows bareground weeds to get started; eat endangered plants; and root holes in tree ferns, which allows water to build up that produces mosquitos, this in turn can spread avian malaria which threatens major forest birds. Bait stations for rats and mongoose control helps protect major forest birds. The pigs are shot and snared but they rapidly reproduce with nine piglets per litter every six months and they are ready to mate after only six months of age. Fences help but are not the final answer to pig control. Goats continue to eat endangered and threaten species of plants, about forty pounds a day. There's a fence around the crater and the rain forest but they still need guns, dogs and snares to control the goats. The Axis deer, which was introduced from India for hunting by the Division of Forestry have no predators. The native plants and many of which are endangered or threatened; have no thorns or chemical defenses to slow down browsing by the Axis deer. The park service has shot three so far. They can jump the fence which is 56 inches high with hog wire up to four feet and then one or two strands of barb wire. Rabbits continue to be a problem from pets that were released on purpose in the fall of 1990. The Park shut down Resources Management operations for two weeks to shoot, trap and remove 102 rabbits in 3 months and install chicken wire fences.

In conclusion; there are more extinctions of species in Hawaii then all of North America combined. 99% of all Hawaiian native birds are endemic (native) to Hawaii. Of the 57 identified species, 23 are extinct, 29 are endangered or threatened and 15 are not threatened at all. 95% of all Hawaiian plants and animals are endemic to Hawaii. I was impressed with Mr. Nagata's research management staff of dedicated; well trained professionals. HNP is fighting many problems with a skeleton crew and on a slim budget. Mr. Nagata is a valuable resource for BAAC.

Sincerely,

Richard L. Lipsey Ph D.
Environmental Toxicologist and Entomologist

Thursday, September 05, 1996

HALEAKALA ENDANGERED PLANTS

Genus	Species	Rank1	Subspecific rank1	FedStatus	InHALE?
Asplenium	schizophyllum			C2	Y
Bidens	campylotheca	ssp.	pentamera	C2	Y
Calamagrostis	expansa			C2	Y
Cyanea	kunthiana			C2	Y
Gardenia	remyi			C2	Y
Joinvillea	ascendens	ssp.	ascendens	C2	Y
Phyllostegia	bracteata			C2	Y
Portulaca	pilosa			C2	Y
Rubus	macraei			C2	Y
Sanicula	sandwicensis			C2	Y
Schiedea	diffusa			C2	Y
Sicyos	cucumerinus			C2	Y
Stenogyne	haliakalae			C2	Y
Strongylodon	ruber			C2	Y
Tetraplasandra	kavaiensis			C2	Y
Thelypteris	boydiae			C2	Y
Bidens	micrantha	ssp.	kalealaha	E	Y
Clermontia	oblongifolia	ssp.	mauiensis	E	Y
Cenitis	squamigera			E	Y
Geranium	arboreum			E	Y
Geranium	multiflorum			E	Y
Ischaemum	byrone			E	Y
Melicope	balloui			E	Y
Melicope	ovalis			E	Y
Panicum	fauriei	var.	carteri	E	Y
Phlegmariurus	mannii			E	Y
Plantago	princeps	var.	laxiflora	E	Y
Schiedea	haleakalensis			E	Y
Cl[illegible]ontia	samuelii			PE	Y
Cy[illegible]	copelandii	ssp.	haleakalaensis	PE	Y
Cyanea	glabra			PE	Y
Cyanea	grimesiana	ssp.	grimesiana	PE	Y
Cyanea	hamatiflora	ssp.	hamatiflora	PE	Y
Platanthera	holochila			PE	Y
Schiedea	hookeri			PE	Y
Chamaesyce	celastroides			SYN	Y
Cyanea	macrostegia			SYN	Y
Argyroxiphium	sandwicense	ssp.	macrocephalum	T	Y

– Synonym

Wednesday, May 01, 1996

ANSWER

Page 1

Genus	Species	Rank1	Subspecific rank1	FedStatus
Anas	wyvilliana			E
Argyroxiphium	sandwicense	ssp.	macrocephalum	T
Asio	flammeus	ssp.	sandwichensis	C2
Asplenium	schizophyllu			C2
Bidens	campylothec	ssp.	pentamera	C2
Bidens	micrantha	ssp.	kalealaha	E
Branta	sandvicensis			E
Calamagrostis	expansa			C2
Chamaesyce	celastroides			SYN
Clermontia	oblongifolia	ssp.	mauiensis	E
Clermontia	samuelii			PE
Cenitis	squamigera			E
Cyanea	copelandii	ssp.	haleakalaensis	PE
Cyanea	glabra			PE
Cyanea	grimesiana	ssp.	grimesiana	PE
Cyanea	hamatiflora	ssp.	hamatiflora	PE
Cyanea	kunthiana			C2
Cyanea	macrostegia			SYN
Dermochelys	coriaceae			E
Gardenia	remyi			C2
Geranium	arboreum			E
Geranium	multiflorum			E
Hemignathus	lucidus			E
Himantopus	mexicanus	ssp.	knudseni	E
Ischaemum	byrone			E
Joinvillea	ascendens	ssp.	ascendens	C2
Laskurus	cinereus	ssp.	semotus	E
Loxops	coccineus	ssp.	ochraceus	E
Megalagrion	pacificum			C1
Melicope	balloui			E
Melicope	ovalis			E
Monachus	schauinsland			E
Palmeria	dolei			E
Panicum	fauriei	var.	carteri	E
Phlegmariurus	mannii			E
Phyllostegia	bracteata			C2
Plantago	princeps	var.	laxiflora	E
Platanthera	holochila			PE
Portulaca	pilosa			C2
Pseudonester	xanthophrys			E
Pterodroma	phaeopygia	ssp.	sandwichensis	E
Rubus	macraei			C2
Sanicula	sandwicensis			C2
Schiedea	diffusa			C2
Schiedea	haleakalensi			E
Schiedea	hookeri			PE
Sicyos	cucumerinus			C2
Stenogyne	haliakalae			C2
Strongylodon	ruber			C2
Tetraplasandr	kavaiensis			C2
Thelypteris	boydiae			C2

PRELIMINARY STUDY OF THE BEHAVIOR AND ECOLOGY OF AXIS DEER ON MAUI, HAWAII

by Dr. George H. Waring, Department of Zoology, Southern Illinois University at Carbondale, 62901-6501

STUDY AND OBJECTIVES.

This study was undertaken on behalf of the NBS Research Laboratory at Haleakala National Park (Maui, HI) to better understand axis deer (*Axis axis*) that inhabit Maui. The objectives of the study were to (1) determine the distribution and habitat preference of axis deer on Maui, (2) determine the behavior patterns of the deer, including movements and foraging, (3) characterize their ecological and social needs, (4) describe signs left by deer that reveal their presence and utilization of a site, and (5) offer insight regarding deer influx into Waikamoi Preserve and Haleakala National Park.

Field work was conducted from January to early April 1996. In addition, interviews of local citizens were also conducted to expand upon the field observations; the cooperation of these individuals was helpful and sincerely appreciated. Permission given to study the deer on the Haleakala Ranch, The Nature Conservancy's Waikamoi Preserve, as well as the Ulupalakua Ranch is gratefully acknowledged. The staff of Haleakala National Park and The Nature Conservancy were especially helpful as was Sumner Erdman of the Ulupalakua Ranch.

HISTORY AND DISTRIBUTION OF THE AXIS DEER ON MAUI

Eight axis deer (three bucks, four does, and one male fawn) were brought to the Hawaiian Islands in December 1867 and released on Molokai Island in January 1868. Later several deer were transferred to Oahu; a herd was present on Diamond Head prior to 1898 and an additional herd became established in Moanahua Valley about 1910 (Tomich 1986). In 1920, twelve deer of the Molokai population were transplanted to Lanai (Graf & Nichols 1966). Deer populations flourished on Oahu, Molokai, and Lanai. Variable hunting pressure has existed on these populations since the early years and has been the main management tool. On Molokai the population increased to 1000 within 20 years and reached perhaps 7500 before specific control measures were taken; hired hunters killed more than 3500 during 1900-1901 (Tomich 1986).

In September 1959, five axis deer (two bucks and three does) from the existing Hawaiian population were introduced to Maui at the 457 m (1500 ft.) elevation on Pu'u O 'Kali about 6 km east of Kihei; later, in July 1960, four additional deer (one buck and 3 does) were released at the Kaonoulu Ranch, near the 1959 release site. By 1968, the Maui population was estimated to be 85-90 animals (Kramer 1971). By 1995, the population on the Ulupalakua Ranch alone was >500 (Erdman, pers. comm.) and reports of deer have occurred over much of Maui. Highest numbers occur nearest the original release site and extend southward around the leeward side of the Island; few deer presently occur along the windward slopes. Year-round hunting is now permitted.

TAXONOMY, GEOGRAPHIC ORIGIN, AND BASIC BIOLOGY

Order Artiodactyla
- Family Cervidae
  - Subfamily Cervinae
    - *Axis axis* (Erxleben 1777) -- Axis Deer (syn.: Chital, Cheetal, Spotted Deer)

Geographic Origin: India, the island of Sri Lanka (Ceylon), and Nepal
Type Locality: Banks of the Ganges, Bihar, India
Introduced to the former Yugoslavia, western republics of the former USSR, Andaman Islands, Australia, Hawaiian Islands and Texas (USA), Brazil, Argentina, and Uruguay (Grubb 1992).

From the study on Molokai and Lanai by Graf & Nichols (1966), mature male axis deer have a mean shoulder height of about 0.94 m (36 in) and weight of 72 kg (158 lb) [high being 98-110 kg], whereas females on the average have a shoulder height of 0.75 m (30 in) and weight of 45 kg (100 lb) [high being 55-64 kg]. Males (> 1 yr) have antlers which in older bucks can attain a beam length of 94 cm (37 in). White spots on a russet hair coat are characteristic of all sex/age classes; the face and neck of does are often slightly lighter in color than bucks. Individual hairs are soft and flexible, unlike the brittle hair of North American cervids. Hoofs of the front feet are slightly longer than those of the hind feet, measuring from 4.1 to 6.1 cm. The toes taper to a sharp point. Sexual dimorphism is not evident from the size of the track.

In axis deer (chital), the basic social unit is a matriarcnal family group consisting of an adult female, her offspring of the previous year, and a fawn. Groups composed of two or more of these family units often occur and may be accompanied by additional deer of mixed sex/age classes (Fuchs 1977); mixed sex/age groups are frequent in the rutting season (Khan & Vohra 1993). Two additional associations commonly seen among chital are all-male herds and nursery herds, the later consisting of only females with fawns (Fuchs 1977). Herds of over 500 individuals have been observed, but smaller groupings are more typical (Tak & Lamba 1984). In Texas, average monthly herd size varied from 2-15 individuals (Fuchs 1977), whereas in India 5-38 were noted (Schaller 1967); feeding groups are regularly larger than resting groups. In Sri Lanka, 27% of the groups (≥ 2; n=1003) observed by de Silva & de Silva (1993) consisted of 2-4 individuals; solitary deer were also rather common. They noted bachelor herd mean size was 4.6, with 16 being the largest; Schaller's (1967) largest all-male herd was 23; Tak & Lamba's (1984) high was 92 . In general, herd stability of axis deer is poor; marked individuals, both male and female, have been observed to change associations frequently, sometimes daily (Schaller 1967; Fuchs 1977; Miura 1981). Thus, the most cohesive unit is that of mother and young (de Silva & de Silva 1993).

During the Molokai/Lanai study of Graf & Nichols (1966), the deer avoided being away from forest cover during the heat of the day and when humans were around. Thus most open-area feeding occurred in late afternoon, during the night, and during the first hours of daylight. In cooler weather, feeding extended over much of the day. Grazing activity was found to occur throughout the day in Sri Lanka but tended to lessen during mid-day hours when shade-seeking among trees replaced grazing on grasslands (de Silva & de Silva 1993); the deer commonly visited water holes in late afternoon. In India (Tak & Lamba 1984), deer feeding activity peaked at dawn and sunset during the cold as well as hot seasons, with more prolonged peaks in the cold season. However, during the rainy season, feeding was in bouts at various hours presumably because of intermittent rain and/or because food was in abundance. Most studies have noted that rest occurs periodically when not feeding; Schaller found (1967) rest was especially routine after midnight until shortly before dawn. On overcast days, axis deer tend to remain more active on grasslands and do not seek the shade of trees during mid-day (e.g., Schaller 1967; Tak & Lamba 1984).

Annual home ranges of males tend to be larger than those of females; ranges also vary depending on resource availability. Moe & Wedde (1994) monitored radio-tagged deer in Nepal and found ranges for females were 62% of those for males in the cool-dry season, 67% in the hot-dry season, and 55% during the monsoon; male home range were approximately 100 ha, whereas female ranges were approximately 60 ha. At other locations, authors have estimated ranges of individual deer as large as 600 ha (e.g., Schaller 1967; Fuchs 1977). Chital are rarely found above an altitude of 1160 m (3500 ft) in their native Asian habitats, including Nepal (Schaller 1967), or

on Molokai and Lanai (Graf & Nichols 1966).

The axis deer is primarily a grazer, preferring newly-sprouting grasses (Tak & Lamba 1984; Elliott & Barrett 1985; Henke et al. 1988); yet during the year numerous plant species are eaten (e.g., Schaller 1967; Tak & Lamba 1984; Dinerstein 1987 & 1989). The rate of feeding is about 90 bites per minute (Schaller 1967). Graf & Nichols (1966) noted Molokai/Lanai deer grazed when grass was green and abundant; browsing occurred when grass was scarce or when browse was particularly palatable or accessible. In India, chital have been observed to shift during peak dry periods from eating especially grasses to eating other plants materials, such as fruit of *Emblica* and *Xeromphis* (e.g., Schaller 1967; Johnsingh 1981).

How often axis deer drink appears to depend on season and availability. Schaller (1967) concluded at least two treks (at sunrise and late in afternoon) were made to water each day during the hot season; fewer trips were made in other seasons. The duration of drinking was normally less than 90 sec. Mineral licks were also utilized periodically, where deer supplemented their diet with added phosphate, calcium, and perhaps other minerals (Schaller 1967).

The mean defecation rate has been estimated under wild conditions at 24.0 pellet groups/deer/day (Dinerstein 1980) and under captive conditions at 23.0 pellet groups/deer/day Dinerstein & Dublin 1982); little difference has noted between sexes or age groups. According to Graf & Nichols (1966), fecal pellets of Molokai/Lanai axis deer ranged in size from 6-9.5 mm in diameter and 13-25 mm in length. The pellets often were tear-drop shaped with a nipple on one end and a slight indention on the other; they were also other shapes, such as cylinders with evenly rounded ends. Scats appeared dark green and soft when fresh but later changed to dark brown or black and became dry and hard. Until fawns fed extensively on vegetation (3-5 wks), they produced soft, viscous scats; thereafter, fawn pellets appeared like those of older deer. Fawns ≤ 1 mo were inclined to urinate only in quiet, sheltered spots. Buck fawns, like older males, commonly urinated while recumbent and resting.

In the Hawaiian Islands, axis deer reproduction is aseasonal; yet >90% of mature females produce fawns annually when forage is good. Males are fertile year-round. Breeding, fawning, as well as the shedding and regrowth of antlers occur throughout the year. Although all stages of reproduction and development can be observed in the field in any season, some trends have been noted. Most fawns are born from mid-November to April and the peak antler maturation as well as rut activity occur from April to August. Both sexes reach puberty toward the end of their first year of age, although some females have been known to breed and conceive earlier. Multiple estrous cycles occur each year. Gestation appears to be 7.5 months. Does come into breeding condition within a few months after giving birth (Graf & Nichols 1966). Chapple et al. (1993) determined a mean estrous cycle of 19.3 days (range 17-21) and average gestation of 234.5 days (range 228-239). Single fawns are the norm; twinning is rare (Graf & Nichols 1966).

Prior to giving birth, a female leaves her yearling and other companions and seeks a se 'ed spot. The fawn is kept hidden for 2-3 weeks and is cared for only by the mother. Usually the fawn is left in a recumbent position in a well-protected place; the doe returns periodically to nurse the infant, often after an absence of 1-2 hours. When danger appears, the doe runs off alone leaving the fawn recumbent and hidden; the doe makes a "yup" call as she bounds away as if to call attention to herself to draw the intruder away from her infant. Nursing last only 10-15 seconds and undoubtedly occurs periodically throughout the day; a hand-reared fawn eagerly consumed 550 ml (18 oz) of milk three times per day. Fawns mouth vegetation in their first week and gradually begin to consume plant materials over the next month until considerable amounts are taken. Weaning occurs soon after the fawns reach four months of age; thereafter, fawns regularly consume water but not before (Graf & Nichols 1966).

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING

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September 26, 1996

FACTS ON FLORIDA ALIEN SPECIES PROBLEMS

Florida has 63% of all U.S. alien or non-indigenous species (NIS) birds. Florida has suffered a 90% reduction in wading birds since 1956, primarily from draining wetlands, erecting buildings, mercury pollution, ect. Twenty five percent of all Florida plants are non-indigenous species. Florida has the highest number of NIS reptiles and amphibians as well.

Our biggest problem are in Miami. Eight five percent of all imported plants enter Florida through Miami. In 1995 we had 150 USDA/APHIS inspectors. But by the end of 1996 we will have 240 federal inspectors from USDA/APHIS. They are responsible for inspecting primarily ships and airplanes. LAX has 66 inspectors and will have no additional inspectors this year. Our state inspectors number 80 with 60 support personnel for a total 120 Florida Department of Plant Inspection Personnel. DPI inspects truck traffic on all 25 highways into the state of Florida, and they charge $70.00 per truck, ie Mexican tomatoes which takes an average of two hours.

Florida alien species fall into three categories; plants; insects/diseases and animals. The most important alien plants includes hydrilla and water hyacinths, which together are choking out thousands of acres of lakes, ponds and streams, especially in South Florida. Hydrilla primary chokes out growth under water, while hyacinths cover the surface of the water. Both create a situation of oxygen depletion while undergoing necrosis. They also out-compete native plant species and ultimately destroy fishing and boating recreation. The ditch banks in South Florida are now dominated by Brazilian pepper, melaleuca trees and long leaf Australian pines which have out competed all other native species and are of no value as wood so they are not harvested. The introduction of melaleuca trees and Brazilian pepper were deliberate introductions and the result has been disastrous. Australian pines and Brazilian pepper; the two dominate pest plant species in South Florida were deliberately introduced by the ornamental industry. These two trees have altered the natural water flow thus decreasing the populations of nesting wading birds and encouraging the spread of non indigenous fishes, most of which were dumped from aquaria and fish culture facilities. Pollution from nitrogen and phosphorus fertilizer from the sugar cane industry has been linked to excessive growth of hydrilla; water hyacinth, as well as melaleuca and Brazilian pepper. Melaleuca covers four hundred and fifty thousand acres with a rate of spread of fifty acres a day thereby threatening all of Florida's wetlands not just ditch banks. It has no natural predators or diseases in Florida and therefore represents a mono culture replacing natural habitats. The cost of removal of melaleuca trees range from $200 to$500 an acre with an estimated management cost in South Florida of $1.0 million a year. Hydrilla removal and spraying costs in excess of $7 million a year plus the loss of revenue from fishing, and tourism as water ways are choked. The Exotic Pest Plant Council (EPPC) is an organization of 40 member agencies as well as local and private groups to promote the coordinated effects in developing management programs and assisting in the preparation of appropriate legislation seeking government funds to manage invasive plants and wetlands in upland forests. The EPPC in cooperation with state and federal agencies have established a melaleuca free buffer zone along the eastern boundary of Everglades National Park, while manual removal of trees and herbicide use for control are today's major mechanisms. Research is under way to identify permanent biological control agents and an Australian weevil was imported 2 years ago. Massive attempts to control these tree and shrub pests have failed. Florida's sub-tropical and prolonged growing season; fresh water resources and ecosystem industries favor the introduction and establishment of NIS plants. We have an average rainfall of 53 inches, the temperature is from 73-82 degrees F. The thirty five hundred square miles of the Everglades National Park is one of the largest in the eastern U.S.

The dominant insects and disease alien species are : oriental fruit fly; med fly; citrus leaf miner; mole crickets; fire ants; brown citrus aphid and citrus canker. Each of these NIS species has a damaging impact on Florida's agriculture and presents a funding cost for control and eradication efforts. Many NIS species have negative human health consequences. There are documented human and animal deaths from fire ants stings. The Florida Department of Agriculture has destroyed 15,000 citrus trees in South Florida in the last year in attempts to eradicate citrus canker. Ten years ago, we destroyed 20 million trees at a cost $200 million dollars for citrus canker eradication. Five major pests have recently been introduced or reintroduced into Florida in the last five years; the brown citrus aphid was introduced in November, 1995; citrus canker invaded in 1993 and again in 1995; the Mediterranean fruit fly (med fly) was introduced in 1995; the oriental fruit fly was introduced in 1995 and the citrus leaf miner was introduced in 1991. Citrus is of course Florida's largest agricultural commodity.

The three most important alien animals are the cane toad; the African giant snail and the Cuban brown anole which is replacing our native green anole. Fruits, vegetables and nursery stock are heavily inspected and quarantined primarily in Miami.

A total of 75 to 100 percent of high risk shipments are inspected and x-rayed. A computer program is being prepared to specifically target high risk countries /commodities/ and pests, for example cut flowers on California which contain brown garden snails at certain times of year but more importantly commodities from Guatemala, and the Philippines Jamaica are targeted. Several other countries, primarily in Central and South America, are especially targeted for particular alien species on particular alien commodities at particular times. We also use in- country inspectors overseas to prevent shipment of alien species from host countries. Companies importing commodities pay up to $460 a year for the right to ship their commodities into Florida and to help defray the cost of inspection. A new color x-ray is being set up this year and a new 3-D x-ray using tomography is being studied.

In Florida successful management and eradication programs for NIS species require a coordinated effort in educating the public; coordinating all state and federal agencies and maintaining consistent funding for short term and long term research and planning. An inventory of NIS distribution and potential impact is needed to set management priorities. Early detection reduces cost and control. In 1993 impacted parties agreed to a 20 year restoration and clean-up program in Everglades National Park which will cost $465 million.

Sincerely,

Richard L. Lipsey Ph D.
Entomologist and Pesticide Toxicologist

APPENDIX E

THE MAJOR TAXONOMIC GROUPS THAT BECOME INVASIVE ALIEN PESTS IN HAWAII AND THE CHARACTERISTICS THAT MAKE THEM PESTIFEROUS

THE MAJOR TAXONOMIC GROUPS THAT BECOME INVASIVE ALIEN PESTS IN HAWAII AND THE CHARACTERISTICS THAT MAKE THEM PESTIFEROUS

Prepared as part of the Biological Assessment for the
Kahului Airport Master Plan Improvement Project

for

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Hawaii Biological Survey
Technical Report No. 1996.022
28 January 1997

INTRODUCTION

During the preparation and review of the Biological Assessment for the Kahului, Maui, Airport Expansion Project, concerns were raised on the potential environmental risks resulting from the possible increase in rate of introduction of harmful alien species. These concerns are reinforced by well-known horror stories portraying the impacts of invading alien species, especially in Hawaii (Vitousek et al. 1987), and by the realization that the rapidly expanding world trade and international travel currently underway significantly increase the risk of future disasters.

The introduction of alien organisms is the greatest single threat to the conservation of native species and to the integrity of Haleakala National Park and other natural areas on Maui (Brockie & al. 1988). The impacts caused by alien species are the most important factor in population declines, endangerment, and extinctions of native organisms in Hawaii (CGAPS 1996; Holt 1996). Furthermore, alien species can undo all other conservation programs. Alien species are also a major impediment to agricultural and economic development (including tourism) in Hawaii, causing hundreds of millions of dollars damage to the economy each year (CGAPS 1996). Thus, there is an urgency to design and implement more effective inspection programs and other mitigative strategies to prevent new alien pests from becoming established in Hawaii when designing and constructing new travel facilities (Holt 1996), such as at the Kahului Airport Expansion Project. However, improving alien pest prevention procedures and mitigating the effects of alien species requires the ability to predict the origins, mode of travel, and identities of potential pests.

This report addresses the following questions: What taxonomic groups are involved? What common characteristics do they have that allow them to become pests? And what are the important mechanisms by which they gain entry to Hawaii? A comprehensive analysis would be daunting as between 5,000 and 6,000 alien species already are established in the wild in Hawaii (Eldredge & Miller 1995; Miller & Eldredge 1996). Therefore this report will synthesize the pertinent information, describe the general phenomena involved, and illustrate these with relevant examples. This report will cover only terrestrial species. The risk of invasions of marine organisms result mainly from shipping, not aircraft, the purview of this report. However, many marine organisms may enter Hawaii as purposeful introductions (including smuggling) on aircraft. Even the water used to carry marine organisms for food consumption (e.g., shrimp, lobsters, and fish), for aquaria, and for other uses may contain a witches brew of undesirable alien micro-organisms (Carlton 1996).

The environmental problems posed by invasive alien species is global, and the quest for solutions is becoming more urgent and international in scope (Baskin 1996; Vitousek & al. 1996). Recently, Norway hosted a United Nations Conference on Alien Species that called for global action to curb the increasing rate of unwanted species introductions worldwide (Baskin 1996; Schei 1996). Also in 1996, the US Congress drafted a National Invasive Species Act that at present addresses invasions via ship ballast, but the prospects are likely that a more inclusive law governing other alien species will soon be passed.

INVASION ECOLOGY: HAWAII

Being more than 3500 kilometers from the nearest comparable high island chain or continent, few organisms were able to disperse to and successfully colonize the islands naturally. Since islands appear to have existed continuously since Kure formed about 29 ma ago (Carson & Clague 1995), and since the endemic biota evolved from about a 1000 original colonists (Mueller-Dombois & al. 1981), then on average a new group successfully colonized Hawaii about once each 29,000 years. Of course, some indigenous (non-endemic native species) organisms arrive much more frequently (e.g., migratory birds). Even so, the Hawaiian biota evolved in splendid isolation, and some groups have evolved into many different closely related species, each able to exploit a different environment or niche. Humans have broken the isolation of Hawaii, and over 5,000 alien species are now thought to be established in the wild (Eldredge & Miller 1995). There has been much speculation about the reasons for this invasion and the apparent vulnerability of the native Hawaiian biota. Some of this speculation remains unsupported, but it is useful to review the pertinent evidence to better understand past invasions as well as make predictions about the effects of new invasions.

First, the apparent vulnerability of Hawaii to the impacts of invasions can best be understood within the concept of novel perturbations (Howarth & Ramsay 1991). Evolutionary theory predicts that species are admirably adapted to their environment, even taking advantage of natural disturbances to gain new ground or as cues to synchronize their life cycles. For example, fire climax communities require periodic fires to maintain themselves, and flood plain communities require periodic inundation. Severe environmental impacts result from the effects of novel perturbations; i.e., disturbances for which the community has had at most rare previous experience. To recognize the novelty, a disturbance should be envisioned as it affects the biotic community, not as it affects human interests or assumptions. For example, a minor flood at the wrong time or absence of a flood at the correct time may affect a flood-adapted

community far more seriously than an exceptionally severe flood at the correct time.

Because of its extreme isolation, many higher taxonomic groups (e.g., reptiles, amphibians, ground-dwelling mammals, and many invertebrate groups) are not present in the native biota of Hawaii. When representatives of these groups arrived with human help, some created novel perturbations for native species. More importantly, many recent invaders are adapted to take advantage of novel human-caused disturbances, such as fire, land clearing, development of agroecosystems and urban habitats, and grazing by domesticated stock. A similar vulnerability is recognized in eastern North America where the vast majority of ruderal herbs are invaders from Europe, where they have had a long history of co-evolution in Western style agroecosystems (Niemelä & Mattson 1996).

Characteristics of Colonizing Species

An invasion is defined as the establishment, increase, and spread of an alien population that leads to its becoming a detrimental competitor in the new community. Invasiveness is not an intrinsic character of the invader, but results from the integration of the requirements and traits of the invader with the local biotic and abiotic factors in the new area. To become invasive, a colonizing population must only have an average rate of increase greater than 1; that is, to continue to increase. This can be accomplished by having either a high reproductive potential or a low death rate. The most successful invaders often enjoy both strategies because they are able to exploit naive new food resources in the absence of many of their competitors, diseases and predators. The principal or most commonly shared characteristic among invaders worldwide is the opportunity to disperse to a new area. Once an opportunistic founding population arrives in a new area, both stochastic events and environmental factors determine whether it can successfully establish. Experience from purposeful introductions suggests that stochastic events are important, as many well-planned introductions fail to establish.

In order to establish a successful breeding population, a colonizing species must be pre-adapted genetically to exploit the resources in the new land. Potential hosts must be present in enough numbers and in the right developmental stage; nesting and roosting sites, reproductive cues, and other ecological requirements of the species must also be present; and climate, including properly cued seasonal changes, must fit the development of the colonizing species. Since the chances of both sexes being introduced simultaneously are low and the vagaries of finding a mate

in the new land are high, hermaphroditic and parthenogenetic species (i.e., those able to reproduce asexually) have a much better chance of becoming established than do sexually-reproducing species (Howarth & Moore 1983). Indeed, a high proportion of alien invertebrates in Hawai'i can use one of the former types of reproductive strategies. It also follows that generalist species establish more easily than specialists, since the former, with their wider host or prey ranges, are more likely to find suitable food. The genetics related to colonizing ability and invasiveness are becoming better understood, and this understanding will lead directly to management, control and quarantine recommendations (Baskin 1996; Rejmánek 1996).

Competition with already established species is important but not primary in determining whether a particular species establishes or not; that is, species packing (the number of species that can share or exploit a given habitat and resource) is a separate phenomenon from the establishment of a colonizing species. One of the outcomes of the Hawai'i International Biological Program (IBP) studies was the realization that, as more species become established in a habitat, it becomes more probable that additional species will find a suitable niche; thus, the chance of an alien species being able to establish is directly proportional to the number of species already present rather than inversely proportional, as is usually assumed (Mueller-Dombois & Howarth 1981). However, in the absence of disturbance regimes favoring monospecific communities (e.g., agriculture), the greater number of species present the less likely a new arrival may be able to monopolize an area or resource.

A newly establishing species, however, often creates new niches within an ecosystem in that initially, it or its products may not be exploited by the resident species. In time, either some resident species will adapt to exploit the alien, or other aliens will arrive to exploit it (Conner et al. 1980). This process is occurring in many lowland, human-disturbed habitats in Hawai'i, wherein the establishment of alien species is enhanced by the disturbance caused by humans or by introduced organisms. Each new alien further improves the chances of colonization by yet additional species (Howarth 1985a).

All species that are able to survive in a new environment are potential invaders. There is often a long lag period between establishment and recognition that there is a problem (Crooks & Soulé 1996). This lag may be caused by simple slow population growth, so that it takes time for a population to reach a problematic size. Second, the lag may be related to the absence of appropriate associated species necessary for effective

reproduction and spread; or to the absence of appropriate disturbance regimes, or the presence of detrimental disturbance regimes that when changed allow the population to increase; e.g., fire or grazing. And third the organism will improve its adaptation to the new environment with each generation; thus time is on the side of the invader (Crooks & Soulé 1996). Eventually even seemingly innocuous alien species may expand from low population size and become invasive. In hind-sight it is often possible to determine the change that allowed such species to better exploit the new environment, but we need a way to predict such phenomena before they occur.

The IBP studies found that, phenologically, Hawaii could be considered perpetual spring (Mueller-Dombois et al. 1981); that is, temperate organisms arriving in Hawaii would find environmental conditions equivalent to spring or early summer conditions. For most organisms, such a climate and plant phenology regime would be close to the beginning of their growth and reproductive stages, which would be the ideal time for them to establish. Many temperate species have escaped their winter diapause and adapted well to Hawaii and become invasive. Tropical species arriving in Hawaii, also find an equitable climate that fits their needs well.

Chance of establishment: Maui Vs. Oahu.

Airport expansion and use at Kahului will certainly increase the risk of introductions of alien species into Hawaii. However, it is also true that organisms escaping at Honolulu airport and subsequently establishing on Oahu have a high probability of eventually dispersing to Maui and other Hawaiian islands, although the most serious invaders might be quarantined on Oahu to buy time to develop controls before they spread to other vulnerable islands. The chance of an alien species establishing and becoming invasive is better correlated with its opportunity for dispersal; that is to the volume of air traffic: number of flights, number of passengers, and amount and type of cargo from each of the source areas; rather than to the local environment at the two airports. Still it is useful to compare the relative risk at the two airports.

Wind

Many organisms, including most insects, some other invertebrates, many micro-organisms, and many plants, regularly disperse on wind currents; and a large percentage of the native biota originally were carried to Hawaii on the wind (Carlquist, 1980). Many factors affect an organism's ability to disperse on the wind. For example, insects and other arthropods behaviorally avoid exposure to high winds, or disperse only at

certain times of the day; and passively dispersing propagules may drop out of the air column only at convergent zones (that is, where two wind currents meet) or in eddy currents. Invading species may also take advantage of the wind to disperse; thus air currents near ports of entry can be important in determining the rate of establishment and spread of alien species, especially those arriving as stowaways or inadvertently.

Both the Kahului and Honolulu airports are windy environments that are dominated by the northeast trades, which blow about 90% of the time in summer and 50% in winter (Armstrong 1983). At HIA, the trades would carry dispersing organisms seaward or along the Ewa coast. During warm days a locally produced onshore breeze could offset the trades and prevent some dispersing aliens from being blown out to sea. At Kahului, the trades, which are average slightly stronger than at HIA, would carry propagules towards the isthmus, and from there, the diurnal orographic wind could carry some organisms up Haleakala or the West Maui mountains. Although it is difficult to quantify the level of risk caused by wind at Kahului airport or to compare the relative risk of wind at Kahului with the risks at other airports, the prevailing windy conditions at Kahului airport are important in the potential establishment and spread of invading alien species. Corroborating this assertion are the large numbers of insects and other waifs that are carried by the wind to the summit region of Haleakala during the day from lower-elevation slopes (Beardsley 1966). In fact, this wind-borne organic material supports an aeolian ecosystem there (Howarth 1987).

Habitats

Gagnè & Cuddihy (1990) recognized about 150 vegetation communities grouped into five altitudinal zones: coastal, lowland, montane, subalpine, and alpine. A comparison of the communities recorded on Maui and Oahu provides a rough approximation of the greater ecological diversity on Maui than on Oahu. The numbers are approximate: Oahu is better known, and some of its communities are subdivided more finely than similar communities on Maui; also certain alien communities are listed, and more of these occur on Oahu. However, as expected the coastal and lowland zones are approximately equal on the two islands. Sixty-six communities are listed for Oahu and 64 from Maui.

Maui is larger and higher, and upland communities are better represented there. Only three montane communities are recognized on Oahu, whereas 19 are found on Maui. There are no alpine and subalpine zones on Oahu and nine on Maui. Thus Maui is about 1/3 richer than Oahu (92 vs. 69) in vegetational communities. Adding the community types not

defined by vegetation (e.g., cave, aquatic, aeolian), Maui would be even richer (i.e., about 120 to 83), but these habitats have yet to be fully enumerated. If we include just the native communities, the ratio becomes close to 2/1. Including alien communities is valid for our purposes since it is a more inclusive measure of habitat diversity as well as the likelihood that an alien species will be able to become established. However, the probability that an alien will harm the natural environment including endangered species may relate more closely to number of native communities. As discussed above in "Invasion ecology", the greater the diversity of species and habitats, the greater probability that an alien species can find a suitable niche and establish in an area.

Honolulu airport is much larger than Kahului Airport and connected with Hickam AFB runways. The greater amount of tarmac and concrete buildings would hinder establishment of some stowaways, but smuggled and purposeful entrants would leave the airport environs. Until recently, there also were sugar cane fields adjacent to the airport. Even now within the Honolulu airport environs there are wetlands, irrigated suburban and urban gardens and lawns, open spaces, golf courses, and abandoned fields. A great diversity of alien plants grows in the airport vicinity, including Japanese gardens and horticultural plantings within the terminal area; all of these provide refuges and hideaways for arriving alien stowaways.

Urban areas are excellent areas for invasions, because of the similarity of environments among different cities and increased opportunity for introductions of urban aliens via human transport. Arriving organisms can find a familiar suitable environment in which to establish and from which to disperse and invade neighboring natural and agricultural environments. Thus, the immediate area near Honolulu airport may be as hospitable as the environment at the Kahului Airport, but this would be difficult to quantify. Funk (1994) lists 176 plant species. occurring in six habitat types within the 1500 acre Kahului airport site; however, Kanaha Pond and surrounding areas within the airport environs were not surveyed. The dominant species she recorded are alien or common native species that are known or would be expected to occur at Honolulu International Airport and other lowland airports in the islands. The source areas; that is, the environs, where the planes and propagules originate, are also usually within disturbed urban settings. Thus for stowaways and some purposefully imported organisms, the likelihood of establishment near the airport may be similar on both islands.

Even if the potential for establishment is equal for Oahu and Maui, opening Maui to overseas flights doubles the potential area available for

colonization. As a hypothetical example consider two baskets of mangoes each with the same two harmful aliens (species A and B) that are smuggled in from Southeast Asia. If both baskets arrive on Oahu, both pests may successfully establish or they may compete and only one establish. Furthermore, evidence from purposeful introductions show that stochastic events play a major role in the initial phase of successful colonization. If one basket arrives on Oahu and the other on Maui, the stochastic and colonization events act separately, so that the chance of both establishing doubles; perhaps sp. A establishes on one island and sp. B on the other. There is evidence that this phenomenon occurs in invasions in that different species first establish or first become problematic on different islands within Hawaii and subsequently spread to other islands. Adding Hawaii and Kauai islands will further compound this problem.

- **What taxonomic groups have become pests in Hawaii? And what characters make them pests?**

•Vertebrates: Mammals, birds, reptiles, amphibians, and fish.

Nearly all alien vertebrate species in Hawaii are pests in some situations, although some also have economic benefits (Stone 1985). The mammals are the best known and provide the best examples of the dilemma created by alien species introductions, especially the ungulates, which have been the most destructive group on native ecosystems but are among the most important groups economically. Other herbivorous and frugivorous vertebrates are often important pests of agriculture as well as threats to native species. The insectivorous and carnivorous species are potentially extremely detrimental to native animals. The impacts of many of the smaller species (especially the lizards) remain poorly documented, but the potential for harm is great as indicated by studies outside Hawaii (Cock 1985; Savage 1987; Schoener & Spiller 1987). Some more recently introduced vertebrates have not yet reached their full distributional range in Hawaii, and their ultimate fate is unknown.

The reasons vertebrates are so destructive as a group results from their relatively large size (which gives them more food and water reserves and wider environmental tolerances than smaller animals); they are also often more generalist feeders, more mobile, and thus more effective competitors than most invertebrates. On the other hand, an observational bias makes it easier for humans to recognize their impacts, especially for the larger species.

A few terrestrial vertebrates (especially the smaller ground and den-inhabiting species) can disperse as stowaways in cargo and aircraft,

and aquatic species may arrive in ballast; but by far the most important avenue of dispersal into Hawaii among the vertebrates has been purposeful introductions for economic, recreational, or cultural purposes often by persons or groups unfamiliar with their potential negative consequences.

•Snails --- Mollusks

Relatively few mollusks, about 85 alien species, have been recorded in the wild in Hawaii. Of these about 40 are confirmed to be established, (Cowie 1997) and a large percentage of the latter are detrimental. A few (including the slugs, apple snails, and giant African snail) are agricultural pests (Cowie 1995). Some are important reservoirs of human and veterinary diseases, and some are important predators and herbivores of native species. The most notorious of the latter is the rosy predatory snail *Euglandina rosea* which is implicated in the extinction of many species of native snails (Hadfield & al. 1993). Slugs threaten native plants and also are a food resource for harmful vertebrates in native habitats, thereby increasing the negative impacts of the latter (Gagné 1983).

The reasons for their pest status results from their high reproductive potential and generalist food requirements. Successful invading species also require a good match of their needs with the local environment. Mollusks are slow moving and often conspicuous so that their role as the cause of the damage is often recognized.

A few pestiferous mollusks arrived in Hawaii as stowaways, probably in shipments of fresh food or plant material, but most arrived as purposeful introductions for food consumption, biocontrol agents, aquaria, or for other purposes (Cowie 1997).

•Insects ---

About 2500 alien insect species are established in Hawaii (Nishida 1994). They are the largest group of unwanted adventive species, but the effects of most species on the Hawaiian environment are unknown. Some of the characters that make them damaging also make assessments difficult: small size, cryptic behavior, and high mobility. Risk also is related to their high fecundity and reproductive potential, low level of population control (e.g., predators and diseases), and match of their requirements to the local environment. They also may adapt over time to new environments or hosts. Many of the most serious agricultural, urban, and environmental pests are invasive alien insect species. Their damage to economic crops is well documented and indicative of their potential for

damage to natural systems (CGAPS 1996) The most damaging groups include the following (Howarth 1985a):

- Social insects (ants, wasps, bees, and termites) and colonial species (scales, whiteflies, and aphids).
- Disease transmitters (e.g., mosquitoes, bark beetles, and many Homoptera).
- Species with mutualistic relationships with other organisms (e.g., pollinators, honeydew producers).
- Some generalists when the match to local environment is good and alternative hosts are abundant (e.g., tachinids, parasitic wasps, and many plant-feeding species).
- Specialists when their host(s) are of economic, cultural, or aesthetic value (e.g., some agricultural pests, endangered species pests, aesthetic plant pests, and veterinary pests).
- Species that disrupt reproduction of valuable or native organisms or that favor the reproduction and spread of other harmful alien species.

Social predators are not present in the native fauna, and wherever aggressive ants and wasps are common, nearly all of the exposed, naive native prey are threatened, as the native fauna evolved in the absence of such a foraging style. Many native arthropods and snails are absent where ants are numerous (Solem 1990; Cole et al. 1992; Gillespie & Reimer 1993). The aggressive species with the larger colonies have the most potential for harm (Howarth 1985a). Reduction of native insect populations also can negatively affect native birds and plants.

Some generalist feeders, especially colonial or social species, may be reducing the ranges of certain native plants. Subterranean termites (*Coptotermes formosanus*) contribute to the decline of native trees in the lowlands and change soil characteristics favoring growth of alien plants. Alien insects are implicated in the decline and endangerment of native plants. Adults of the Chinese rose beetle (*Adoretus sinicus*) often congregate on favored hosts including some endangered native plants (e.g., *Hibicadelphus distans* and *Abutilon menziesii)* (Wagner & al. 1985). The black twig borer *(Xylosandrus compactus)* has an extremely wide host range, burrowing into the growing tips and twigs of its host and introducing the pathogenic ambrosia fungus *(Fusarium solani)*, often killing major branches or the whole tree. Its known hosts in Hawaii include 108 species in 44 families including several rare native species. It is considered to be the most important threat to the endangered *Fuueggea neowawraea, Gardenia brighamii* and *Mezoneuron kavaiense* (Wagner & al. 1985). The black stink bug *(Comptosoma xanthogramma)* was first recorded in Hawaii in 1966, and during its initial J-shaped population

growth in the following decade, it decimated the endangered 'ohai *(Sesbanea tomentosa)*.

Mutualistic relationships can synergistically increase the negative impacts of alien insects (Howarth 1985a). Alien insects spread diseases among humans, economic crops, native birds, and other native organisms (van Riper & van Riper 1985). Alien ants tend aphids and other honeydew producers that attack valuable plants (Reimer 1994). Alien pollinators assist in the spread of alien weeds (Howarth & Ramsay 1991).

About 2,000 alien species established in Hawaii arrived inadvertently. Many insects are masters at dispersal. They are common stowaways on aircraft hiding within the plane as well as in cargo. Most of the inadvertent species arrived associated with their host or the substrate used for diapause (e.g., as eggs in soil, plant material, or on their vertebrate hosts). Species arriving on their hosts can be removed during inspection or quarantine, but many cryptic species escape this process. The ability of insects to invade is emphasized by the convergent accumulation of the same pests on the same crops in different parts of the world. Over 400 insect species were purposefully introduced, mostly as biocontrol agents, but a few as pollinators or for other purposes. Many of these purposeful introductions have also had negative environmental impacts (Howarth 1985a; 1991).

The insects as a group make up for their relatively narrow environmental tolerance by the great number of species; that is, the number of candidate alien species able to invade Hawaii is huge. Worldwide about one million species have been described, but probably another 10 million or more remain unknown to science. Many, if not most of these could establish in Hawaii if they had the opportunity.

The taxonomic impediment, wherein a large proportion of the insects and other arthropods discovered during inspections are new to science or cannot be accurately identified, hinders effective quarantines and control. For example, the mamane moth *(Mecyna virescens)* was originally described as endemic to Hawaii, but Zimmerman (1958) sunk the species under a European species *Uresiphita polygonalis*. For the next 15 years, it was considered an alien pest in native forests and subject to control programs. Then Clarke (1971) and Monroe (1989) recognized that Hawaiian populations were distinct and endemic at least at the subspecies level, the correct name becoming *Uresiphita polygonalis virescens*. This emphasizes that both theoretical and applied ecological work must be based on accurate systematics.

• Other arthropods: (spiders, mites, millipedes, crustaceans, etc.)

Other arthropods present similar concerns as those described for insects, except that most groups are even less well known. A few are agricultural pests or of public health importance. The majority of alien species currently in Hawaii are in the unknown category, and in fact, for some groups (e.g., the mites), it is not yet possible to determine whether some species are native or alien. Some, like the terrestrial isopods and amphipods, are so abundant in some native habitats, that they must have a major role in nutrient cycling, but their effects on the ecosystem are unknown. Like the insects and many other groups, their commonness and therefore relative risk is related to the match of their biological requirements to the environment.

Most of the nearly 500 alien species arrived inadvertently. Only four species, all predatory mites, were purposefully introduced as biocontrol agents. Like the insects, most of the inadvertent introductions arrived via shipping and aircraft associated with their hosts or preferred substrate.

•Worms (earthworms, roundworms, flatworms)

About 50 species of alien worms are recorded from terrestrial and freshwater habitats in Hawaii, but the status of species in most groups has not been determined. For example, 127 species of plant and soil nematodes are enumerated in Eldredge and Miller (1995), without indication of which are alien. Most worms that are agricultural pests or parasites of domestic animals are alien.

All 20 species of earthworms are considered alien. Recent studies on earthworms show that they change soil conditions and nutrient cycling favoring the spread of harmful alien plants. They also are food resources for pigs and other damaging animals. (Vitousek & Walker 1989).

The four flatworms and two nemertines are generalist predators in both disturbed and native habitats, where they are suspected of having a detrimental effect. The flatworm *Platydemus manokwari* has been implicated in the extinction of native snails elsewhere (Hopper & Smith 1992). Some alien nematodes are parasitic on valuable plants or animals; and some of the alien invertebrate parasites transmit pathogenic bacteria among their hosts.

Risk factors include high fecundity, resistant stages, match to environment, evolutionary potential, and mutualistic relationships to other alien species. Except for some of the pest species little is known of

their impacts, but novel diseases and predation are recognized as major threats to native species (van Riper & van Riper 1985).

Most alien worms are carried inadvertently via commerce, probably as resistant stages in soil or organic material, or as parasites on the host. A few, such as the insect-pathogenic nematodes and perhaps some ·redaceous flatworms, were purposefully introduced as biocontrol agents ·oth officially and clandestinely by smuggling and via the post.

•Fungi

Fungi remain poorly studied. About 2,000 species of fungi and lichens are recorded from Hawaii. There are a number of endemic species, but the status of most species is unknown (Eldredge & Miller 1995). Many of the disease organisms of agricultural plants and animals must be introduced. A few insect pathogens are documented biocontrol introductions, but others may be indigenous and the result of natural dispersal. One native plant associated fungus (koa rust, *Uromyces* sp.) may have become more invasive and pathogenic when an efficient insect vector was inadvertently introduced (Leeper & Beardsley 1977).

Fungi disperse naturally, and it may not be possible to sort out the origins of many species found in Hawaii. Nevertheless, there are many plant and animal diseases and other potentially disruptive species of fungi that do not occur in Hawaii. These would most likely disperse with their hosts or host products, but many could easily be dispersed within aircraft. For example, Baker (1966) found 65 species of fungi (including a few new state records) on the shoes of arriving airline passengers. The current efforts to expand world trade, especially importation of fresh foods, will greatly increase the risk of importing additional harmful species (Baskin 1996).

•Other Micro-organisms

Bacteria and other micro-organisms have not been enumerated, and the number of species in Hawaii and their origins are unknown. Many disperse naturally on air currents and are indigenous in Hawaii. The risks and concerns relating to new alien species are similar to those described for the fungi. There are few studies on the ecological effects of free-living bacteria (Gilbert & al. 1993). There is concern that the increase in world travel and trade may enhance the emergence of new human (and native animal) diseases. Already there have been a few examples (Schei 1996). As noted for worms and fungi, risk factors include high reproductive potential, resistant stages, match to environment, evolutionary potential, and mutualistic relationships with other alien

species. Pathogenic bacteria, viruses, and other infectious organisms may have high mutation rates favoring increased virulence and adaptation to new environments and hosts (LeClerc & al. 1996). Infectious diseases are considered a major factor in the decline and extinction of the Hawaiian biota (van Riper & van Riper 1985).

•Plants

The largest group of introduced organisms in Hawaii is the plants with about 9000 alien species listed (Eldredge & Miller 1995; Miller & Eldredge 1996). About 8000 of these, mostly ornamental orchids, grow only in cultivation. About 900 species are established in the wild, and of these circa 100 are causing major environmental disruptions (Smith 1985). Thus most are not a problem now, but many species in cultivation represent potential time bombs.

Risks are related to the species' match to the local environment, especially pollinators, soil conditions, disturbance regimes, mutualistic relationships, fecundity, cloning ability, and climate. The fact that the orchids have not invaded much is curious and instructive. Most species produce thousands of tiny, easily dispersed seeds, but orchids also require nearly species-specific mutualistic organisms for establishment and pollination. Neither the mycorrhizal fungi nor the pollinators are well represented in Hawaii. Furthermore, these cannot establish until their associated orchids become abundant enough to support them, sort of a biological catch 22.

Rejmánek (1996) described the traits shared by woody weeds. He found that r-selected plants (i.e., the tree species that have numerous small seeds, short intervals between massive seed set, and early maturation) were the most successful invaders. These plants also often have a relatively small genome size. Plants with early and consistent reproduction are more likely to be invaders, which seems intuitive; species that can consistently throw the most seeds into the environment are the ones most likely to win the race to colonize available open spaces. Curiously, herbaceous weeds have the additional requirement that their success as weeds is correlated with their latitude of origin. Thus, many species are more restricted by the local climate than are many woody species. This may be analogous to the difference between the vertebrates and invertebrates in which larger vertebrates can acclimate better to local climate than can the invertebrates.

Invasiveness among weedy plants is also correlated with the presence of associated species that assist in their growth, reproduction,

pollination, and dispersal. There are many examples of this in Hawaii: lantana, Christmas berry, and *Myrica faya* might have remained ornamental curiosities had they not been dispersed by alien vertebrates.

Possession of these characters for invasiveness is not always a prerequisite, for even slow growing plant species can cause problems if they have been widely planted for a long enough time. Often the most affected impacted areas have had the longest history of disturbance and intensive planting of aliens (Rejmánek 1996). Also there is often a long lag period between establishment and problems that obscures defining specific invasive characters; slower growing, less rapid reproducers appear to simply take longer to become invasive (Niemelä & Mattson 1996). Therefore, it may be the opportunity for invasions rather than an inherent vulnerability of the native area or the invasiveness of the alien that is more important.

Most plant species, including most of the problem weedy invaders, were purposefully introduced. Except for a short list of known weeds, the introduction of most plants is not regulated. Given the risks, better methods of predicting problem species are needed. Also needed are effective mechanisms to recoup the costs of control and monitoring from the importers of problem species.

SYNTHESIS

There is an urgency to develop predictive abilities to determine potential invasive species before they establish and invade, particularly to evaluate proposals for purposeful introductions but also to develop quarantine strategies. Theories are needed that can help set priorities for quarantine and control of invasive species as well as allow the prediction of the risk of future invasions. Elton (1958) and the SCOPE project (Groves & Burdon 1986) tried to define generalities of invaders in hopes of predicting which species would become troublesome; however, these studies failed largely because they did not integrate the characteristics of the invaders with those of the new environment; did not include data from failed invasions; and were working from incorrect assumptions. Participants at the UN Trondheim conference (Schei 1996) were more optimistic and felt that it will be possible in the next few years to develop expert decision systems for specific regions to assist quarantine and agricultural officials to evaluate and manage proposals to import novel plants. Similar projects are underway for vertebrates (Smallwood & Salmon. 1992) and some other groups, but the many gaps in ecological data will delay usable products (Schei 1996). All groups will eventually be covered. However, species-specific idiosyncracies displayed by invading

populations (e.g., the increase in fecundity of house sparrows) will make some aspects of invasions unpredictable (Hengeveld 1996).

The great lag time in recognizing invasive species is a serious problem in attempts to predict pests and formulate management and quarantine programs. However, it also is an advantage if the potential pest is recognized and action begun before the invasive phase. Time is on the side of the invader if its population is allowed to persist. The rule guilty until proven innocent is the cautious and prudent one (Crooks & Soulé 1996).

The major risk factor in determining which species will become invasive may be the opportunity for potential invaders to establish populations in a new area rather than an inherent vulnerability of the invaded region or the invasiveness of the alien (Crooks & Soulé 1996). That is, any species that can successfully establish and reproduce in a new area is capable of becoming invasive.

Invading species often share a suite of characteristics that may be used to determine the most risky alien species. These include

- (1) Match of the needs of the invading alien to the local environment;
- (2) Ability for rapid reproduction by short life cycle, large number of offspring, etc.;
- (3) Low mortality;
- (4) High mobility or presence of efficient dispersal agents;
- (5) Presence of associated mutualistic organisms.

The relative level of risk that an invading species will cause harm is also related to the following characteristics (Howarth 1991):

- (1) Permanency or persistance of the organism in the environment;
- (2) Host range
- (3) Habitat range;
- (4) Genetic plasticity;
- (5) Behavior;
- (6) Mutualistic relationships;
- (7) Vulnerability of the target region.

Given the great range of environments in Hawaii in general and on Maui in particular, a large percentage of the world's biota may find a suitable habitat in Hawaii. Tropical source areas are a greater risk than temperate areas. Each "new" source area added can bring in new candidates; that is, Hawaii already has many invaders from North America; additional introductions of the same species may not be detected even

though they may increase the risk by introducing new genotypes. However, flights from new areas will likely bring novel harmful species that had not previously had the opportunity to invade. Fortunately, experience from purposeful introductions suggests that most introductions fail. Thus, to be worthwhile, pest prevention measures need to reduce the rate of arrivals of alien species below a certain threshold level.

Historically, Hawaii has been highly vulnerable to the effects of invasions. In large part this results from the high level of disturbance and habitat alterations by humans; its great isolation that has allowed the evolution of a naive native biota vulnerable to the novel effects of aliens; the great range of environments in a small area that gives an alien a greater chance of finding its preferred habitat; and the small area which restricts the availability of refuges from novel perturbations (Howarth & Ramsay 1991).

Quarantines: Quarantine and inspection strategies should be ɜared to the type of organism and method of introduction. Most vertebrates and plants are imported purposefully either legitimately or by smuggling. A few invertebrates and microbes also are intentionally introduced usually by government agencies for biocontrol, but increasingly by smuggling by pet enthusiasts, organic gardeners, and others (e.g., Hunter 1994). Legitimate purposeful introductions need to be regulated, thus also simplifying quarantines and inspections at the time and place of arrival. Smuggling requires additional vigilance and investigative procedures; in 1994, Hawaii Department of Agriculture inspectors captured nearly 100 illegal reptiles and amphibians in Hawaii (CGAPS 1996). The major avenue for long-distance dispersal for other organisms is hitch-hiking on purposefully introduced organisms; therefore regulation and inspection of purposeful introductions will help intercept the hitch-hikers as well. Unfortunately, many serious invaders, especially invertebrates, arrive as stowaways necessitating additional preventative treatment and inspections of aircraft and cargo.

Quarantine procedures and inspections should be designed to educate the public on the dangers posed by alien species. Education programs run in conjunction with pest prevention programs can instill an appreciation for the seriousness of the problem among the public sector. This reinforcement can become a beneficial feed-back process since, to be maximally effective, quarantines and inspections need active public support.

Conflict of Interests: Some invasive aliens are perceived as important economic resources; in these instances, it is important to perform accurate cost benefit and risk analyses before the purposeful introduction is made. If the introduction is approved, the costs associated with monitoring for impacts and control should be shifted to the importers through bonding, insurance, liability, or other methods. The history of introductions of apple snails to Hawaii and elsewhere for food production is an example of the false economy of not conducting pre-release analyses (Cowie 1995; Vitousek & al. 1996).

We need to change cultural mores that favor introduction of alien species and increasingly place the costs associated with alien invasions on the importing persons and agencies. Persons releasing organisms beyond their natural range undertake a grave responsibility; once released these agents are pervasive (i.e., able to disperse far beyond the target system), permanent (i.e., able to multiply and evolve in perpetuity), injurious (i.e., able to harm nontarget organisms), and insidious (i.e., able to affect ecosystems, sometimes in profound ways). Long-term ecological studies are needed on both the efficacy and environmental impacts of all purposeful introductions to make applied ecology more predictive and to produce more appropriate protocols governing proposed introductions. Given the risks, more open public oversight and more comprehensive regulations of all proposals to introduce and release non-indigenous organisms are required.

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APPENDIX F

UNITED STATES DEPARTMENT OF AGRICULTURE
NUMBER OF FOREIGN ARRIVALS TREATED FOR INSECT PESTS

AND

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
DATA FOR INSECT INTERCEPTIONS NOT KNOWN TO OCCUR IN HAWAII FROM MAY 1979 THROUGH JULY 1982

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
300 Ala Moana Blvd, Rm 4117
P.O. Box 50002
Honolulu, HI 96850

December 20, 1996

James G. Dittmar
Edward K. Noda & Associates
Engineers and Environmental Consultants
615 Piikoi Street, Suite 300
Honolulu, Hawaii 96814-3116

I am responding to your request concerning the number of foreign arriving aircraft treated for insect pests and the number interceptions made on passengers and cargo.

These numbers below are for a two year period 1995 and 1996.

Number of air cargo shipments treated = 44

Number of Interceptions From Passenger Baggage = 519 plant diseases and 1,694 exotic insects.

I do not have figures for only aircraft being treated. We treat air cargo but only very rarely treat a commercial aircraft. The number would be very low compared to the number of aircraft arrivals.

Sincerely,

Glenn Hinsdale
State Plant Health Director
State of Hawaii
Western Region

INSECT INTERCEPTIONS DETECTED BY STATE AGRICULTURE WHICH WERE NOT KNOWN TO OCCUR IN HAWAII FROM MAY 1979 THROUGH JULY 1982

YEAR	TOTAL INTERCEPTIONS	NO. NKO	NO. NKO ESTAB.
1979	439	6	0
1980	517	10	0
1981	776	45	4
1982	750	73	5
TOTAL	2482	134	9

9/28/82

TO: W. Fan, HDA Supervisor

FROM: J. Seu

SUBJECT: Insect Interceptions Not Known To Occur in Hawaii From May 1979 Through July 1982

Insect #	Scientific Name	Date	Family Name	Common Name	Host
1441	Anaqrapha falcifera	5/79			Spinach
47446	Acalypterate Fly	5/79			Lettuce
47458	Anaçrapha falcifera	5/79			Letuce
47571	Nysius raphanus	6/79	Lygaeidae		Cargo Containe
44883	Apion sp	7/79			Soil
46294	Coccinella sp	7/79			Lettuce
47679	Lygus sp	2/80	Miridae		Endive
47911	Ctenuchas	2/80	Ctenuchidae	Wasp Moth	Banana
48024		4/80	Elatenidae		
48028	Aphonotus	4/80	Tenebronidae		
47925	Dermestid sp	8/80	Dermestidae		LD3 Container
48127	Coccinella Califor.	8/80			Box wood
48272		10/80	Carabidae		Hay Cube
48273		10/80	Carabidae		Hay Cube
48291	Hylemya brassicae	10/80			Radish
48303	Diabrotica undecimpunctata	10/80	Chrysomelidae		Romaine
48447	Phyllotreta puellin	2/81	Lystasidae		Hatercress
48448	Nysius sp	2/81	Lygacidae		Watercress
48461		3/81	Tenebrionidae		Soybean
48652	Thysanoptera	6/81			Graminae
48637	Anagrapla falcitera	7/81			Red Lettuce
48638	Anagrapla falcitera	7/81			Rid Lettuce
48365		9/81	Fantatomidae		Douglas fir
48509	Nysius sp		Lygaeidae		Lettuce
48512		9/81	Mycetophilidae		Lettuce
48570	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Lettuce
48577		9/81	Hemerobiidae		Lettuce
48579		9/81	Coccinellidae		Lettuce
48589	Vespidae - Funninae	9/81			POV
48593	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Butter Lettuce
48599	Phenacaspis pinifoliae	9/81			Pine Cutting
48611	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Butter Lettuce
48612		9/81	Lygacidae		Butter Lettuce
1994 48613	Hypera postica	9/81			Red Lettuce
48615		9/81	Hemerobiidae		Red Lettuce
48619	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Celery

Insect #	Scientific Name	Date	Family Name	Common Name	Host
48629	Anthicus sp	9/81			Red Lettuce
48630		9/81	Hemerobiidae		Green Lettuce
48632	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Green Lettuce
48680	Coccinella trifasciata	9/81	Coccnellidae	Lady Bug	Watercress
48681	Nysius sp	9/81	Lygaeidae		Watercress
48714	Ostrinia nubilalis	9/81		Eurp. Corn Borer	Corn
48720	Tabanus lineolus	9/81			POV
48721	Diabrotica undecimpunctata	9/81	Chrysomelidae	Cucumber beetle	Lettuce
48724	Halicutus sp	9/81			POV
48754		9/81	Cryptophagidae		Alfalfa
48759	Eleodes sp	9/81	Tenebrionidae		Alfalfa
48089	Macrocyphum euphorbiae	10/81			Lantana
48826	Rhopalosiphum sp	11/81			Red Lettuce
48838	Diabrotica undecimpunctata	11/81	Chrysomelidae	Cucumber beetle	Celery
48876	Nabis sp	11/81			Xmas Tree
48877	Aonidiella aurantii	11/81			Orange
48883	Aonidiella aurantii	11/81			Orange
488903	Aonidiella aurantii	11/81			Orange
488904	Diabrotica undecimpunctata	11/81	Chrysomelidae	Cucumber beetle	Red Lettuce
48922	Hortensis terusree	11/81			Potted Plants
48925	Araneida	11/81			Potted Plants
48828	Asblyscius brevispinus	12/81			Bamboo
48852	Aonidiella aurantii	12/81			Orange
48956	Carphilus lunguiris	12/81			Feed
49042	Anthicus sp.	12/81			Xmas Tree
1991 49051	Scymnus sp	12/81			Xmas Tree
49091	Osoruia sp	1/82			Butter Lettuce
49093		1/82	Cicadellidae		Escarole
491000		2/82	Cicadellidae		Escarole
49143		2/82	Sciaridae		Lettuce
49180	Miesthrea sp	2/82			Catus
48193	Nysius sp	2/82	Lygaridae		Lettuce
49218	Nysius sp	2/82	Lygaridae		Watercress
49161	Nysius sp	3/82	Lygaeidae		Lettuce
49195		3/82	Formicidae		Romaine
49199		3/82	Riculidae		Cut Flowers
1985 49208	Acyrthosiphon Kondoi	3/82			Lettuce
49209		3/82	Hembracidae		Spinach,
49219	Aonidiella aurantii	3/82			Lemon
49273	Geocoris punctipes	3/82			Spinach
49279	Nysius sp	3/82	Lygaeidae		Spinach
49282	Geocoris punctipes	3/82			Lettuce
49784		3/82	Aphididae		Escarole
49285	Diptera	3/82			Spinach
49286		3/82	Aphididae		Spinach
49295	Thais hoemastoma	3/82		Sea Snail	Consignor

Insect #	Scientific Name	Date	Family Name	Common Name	Host
49304	Hysius sp.	3/82			Lettuce
[redacted]	[redacted]	4/82	Diaspididae		Orchid
[redacted]	[redacted]				Palm
49344	Comstockiella sabilis	4/82			Watercress
49370	Derocerus	4/82			Watercress
49371	Lymaea sp	4/82			Citrus
49440	Aleurocanthus	4/82			Lettuce
49288		5/82	Ephydridae		Lettuce
49433		5/82	Mycetophilidae		
49475	Hippodamia convergens	5/82	Coccinellidae		Lettuce
49476	Hippodamia convergens	5/82	Coccinellidae		Lettuce
49477	Hysius sp	5/82	Lygaeidae		Spinach
49484	Hemerobiidae	5/82			Lettuce
49508	Solenopsis sp	5/82			Soymeal
49552	Coccinella californica	5/82	Coccinellidae		Celery
49561	Bradysia impatiens	5/82			Gerbera
49562	Bradysia impatiens	5/82			Gerbera
49563	Bradysia impatiens	5/82			Gerbera
49324	Diabrotica sp	6/82			Lettuce
49509	Coccinella californica	6/82			Syngonium
49590		6/82	Hemerobiidae		Spinach
49591	Anthoplaura aurnoradinta	6/82			Cockles
	Sycharochiton pelliserpentis	6/82			Cockles
49593	Coccinella californicus	6/82			Cut Flowers
49603	Phlegyas sp	6/82			Blue Crabs
49606	Hysius sp	6/82	Lygaeidae		Watercress
49620	Spodoptera sp.	6/82			Bell Pepper
49623	Spondoptera sp	6/82			Bell Pepper
49646		6/82	Pyrrocoridae		Banana
49661	Blatta orientalis	6/82	Blattidae		Feed
49662	Lygus sp	6/82			Spinach
49663	Hysius sp	6/82	Lygaeidae		Spinach
49664	Coccinella californica	6/82	Coccinellidae		Spinach
49698	Coccinella califonica	6/82	Coccinellidae		Cherry
49700	Diabrotica undecempunctata	6/82	Tenebrionidae		Spinach
1994 49701	Hypera postica	6/82			Spinach
49706	Euschistus servis	7/82			Lettuce
49707		7/82	Hemerobiidae		Lettuce
49709	Nabis sp	7/82			Lettuce
49718		7/82	Hemerobiidae		Spinach
49719		7/82	Hemerobiidae		Green Leaf L
49724	Coccinella perplexa	7/82	Coccinellidae		Green Leaf L
49725	Aceratagallia californica	7/82			Green Leaf L
49710	Aonidiella aurantii	7/82			Lime
49726	Geocoris sp	7/82			Green Leaf L

Insect #	Scientific Name	Date	Family Name	Common Name	Host
1994 [redacted]	Pseudococcus elisae	7/82	Coccidae		Banana
49570	Aonidiella aurantii	7/82			Citrus
49763		7/82	Hemerobiidae		Lettuce
49702	Iridomyrmex sp	7/82			Rose
49770		7/82	Hemerobiidae		Lettuce
49500	Coccinella californica	7/82	Coccinellidae		Syngonium
49775	Sypharochiton Pelliserpentis	7/82		Chiton	Cockles
49754	Diabrotica undecempunctata	7/82		Cucumber Beetle	Lettuce
49789	Dysmicoccus alazon	7/82	Coccidae		Banana

Honolulu International Airport

PLANT QUARANTINE INFGAT ACTIVITIES - DISPOSITIONS
07/01/92 - 06/30/93

SUMMARY OF DISPOSITIONS FOR ALL INFGAT ACTIVITIES

ITEM	INSP/REL	TREAT/REL	DESTR/SOB	REF/ENTRY	DEST	TOTALS
Amphibians — 100%						
Lots	137	0	2	0	3	142
Parcels	182	0	2	0	3	187
Animals — 100%						
Vans	0	0	60	0	0	60
Lots	250	0	15	1	2	246
Parcels	668	0	60	1	2	731
Aquatic Life — 100%						
Lots	5,956	17	49	0	43	6,113
Parcels	165,443	42	140	9	136	166,270
Birds — 100%						
Lots	567	0	1	2	0	570
Parcels	847	0	6	2	0	855
Feeds and Grains — 10%						
Lots	6	0	0	0	0	6
Parcels	67	0	0	0	0	67
Flowers/Gras./Dec. Nat. — 10%						
Vans	451	0	0	0	0	451
Lots	13,895	4	31	2	133	14,045
Parcels	203,749	5	49	2	283	204,128
Beneficial Insects, etc. (Quarantined)						
Lots	41	0	7	3	4	53
Parcels	92	0	9	5	25	135
Microorganisms — Rely on paperwork						
Lots	5	0	11	9	1	26
Parcels	16	0	12	10	1	39
Other Miscellaneous Items						
Lots	52	2	1	0	1	56
Parcels	56	26	1	0	3	86
Prop. Plant Materials						
Vans (10% Unrestricted)	69	0	0	0	0	69
Lots (100% Restricted)	4,[illegible]	6	67	50	67	5,165
Parcels	24,481	9	176	176	133	25,175
Produce — 10%						
Vans	12,976	0	1	0	0	12,977
Lots	42,855	28	37	36	254	43,244
Parcels	4,250,149	42	94	502	573	4,251,360
Reptiles — 100%						
Lots	115	0	5	2	2	122
Parcels	151	0	5	2	2	160
Soils — 100%						
Lots	12	0	17	1	14	34
Parcels	35	6	27	1	15	84
TOTAL VANS	13,361	0	61	0	0	13,456
TOTAL LOTS	69,855	67	225	169	520	69,835
TOTAL PARCELS	4,504,654	124	605	664	1,176	4,509,221

APPENDIX G

POTENTIAL IMPACTS OF ALIEN SPECIES ON MAUI

POTENTIAL IMPACTS OF ALIEN SPECIES ON MAUI

Prepared as part of the Biological Assessment for the
Kahului Airport Master Plan Improvement Project

for

LIPSEY & ASSOCIATES, INC.
1400 Prudential Drive, Suite 7
Jacksonville, FL 32207

Prepared By

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Hawaii Biological Survey
Technical Report No.
30 January 1997

C. POTENTIAL IMPACTS OF ALIEN SPECIES ON MAUI

The potential increased impacts that might result from the proposed Kahului Airport Improvement Projects are difficult to define because of several uncertainties, not the least of which is that no one knows what species will be introduced next. As described in Section A and shown in Table A-3, domestic airline passengers are one of the primary pathways by which alien species (plants and animals) enter the state. Other pathways involving overseas flights include foreign airline passengers, military flights, cargo, first class mail, and stowaways in the aircraft; thus about 75% of alien species introductions are suspected of gaining entry to Hawaii via overseas flights (U.S. Congress 1993). Based on passed interceptions and experience, one can predict some future introductions, but the potential for flights from new areas (both foreign and domestic) as well as increased number of flights and changing shipping patterns and passenger preferences, mean that many introductions and their mode on entry will remain unpredictable. Presumably, improved inspection equipment and procedures would intercept purposeful introductions as well as most inadvertent introductions. The potential for environmental impacts is also dependent on which introduced species become established in the wild (see Section E). Based on passed experiences, some of the new alien species that enter Hawaii will become established.

Similarly, the potential effects of new alien species on presently listed or proposed endangered and threatened plants and animals on Maui will depend on which alien species become established and how successful they become. As described in Section E, their success will depend upon their ability to compete for food, to find mates, and to cope with a number of biotic and abiotic environmental factors (e.g., the vagaries of weather). One can safely predict, however, that there will be some impact on presently listed and proposed to be listed plants and animals and that these impacts will be similar or analogous to those that have already occurred; i.e., disruptions of plant and animal communities, disruptions to nutrient cycling and plant-soil relationships, and possible introductions of plant and animal diseases. Furthermore, additional endemic species that are not now candidates may become threatened or endangered from the effects of new alien organisms.

To better define the problem and plan mitigation measures, the following set of examples of selected alien species and their potential impacts are described. These examples (Table XXX) were selected to illustrate the range of pathways by which an alien species might gain entry to Maui at Kahului Airport.

Because currently envisioned overseas flights are expected to originate from the Mainland of North America and from Korea and Japan in Asia, the examples focus on organisms from these areas. However, the increasing use of hubs and containers in airline travel means that the actual origin of a particular flight or its passengers and cargo may be distant from one of these areas.

Table XXX: Some alien organisms that could invade Maui, their origin and possible modes of arrival at Kahului Airport, Maui.

Name Common name	Origin	Modes of arrival
Serpentes Snakes	US mainland, Japan, Korea	Purposeful as illegal pets & as Stowaway
Aves Birds (e.g. parrots)	US mainland	Purposeful as pets
Formicidae (ants) (e.g., fire ants) (e.g., weaver ants	US mainland SEA (& US mainland?)	Stowaway in airplane or container Purposeful as clandestine biocontrol, stowaway
Culicoides spp. Biting midges	Japan, Korea, & N. America	Stowaway on aircraft & immature stages in substrates
Melastomataceae Melastomes	southern NA & Latin America	Purposeful as ornamental & seeds on clothing

SNAKES

The danger to native faunas posed by the brown tree snake is now well known (Savage 1987; Conry 1988; Rodda & Fritts 1992)). However, many snakes are general predators, attacking anything they can catch and often preferring different prey as they grow larger. It is likely that any one of perhaps hundreds of species of the ca. 3000 species of snakes known worldwide could cause equally or even more devastating problems for biodiversity than the brown tree snake if one of them became established on a Hawaiian island. The most problematic species are the arboreal predators of

warm-blooded prey that have the opportunity to travel to Hawaii. Also, many snakes prefer wetland habitats, and if established, some of them could further threaten endangered waterfowl. Snakes can arrive in Hawaii on airplanes in two ways: smuggled in as pets and carried inadvertently as stowaways within aircraft or cargo.

Pets:

A large number of snakes are popular as pets in North America and elsewhere, and the enterprising pet trade readily fills this demand, whether legally or illegally (Anon. 1996). These pets represent a real threat to the Hawaiian fauna as they are frequently purposefully carried to Hawaii. Snakes are banned from Hawaii, but several species have already been captured in the state; e.g., during 1994, 32 illegal snakes were captured in Hawaii (CGAPS 1996). Among popular pet species, two groups (which actually comprise about 2/3 of the living snake species) especially stand out as serious threats to native Hawaiian wildlife should they become established. These are the boids (boas and pythons) and colubrids (especially the rat snakes in the genus *Elaphe*). The boid, *Python molurus*, has been the most frequently transported species and has been intercepted in Hawaii several times during the last few years. *P. molurus* is native to India, southern China, and Southeast Asia and can grow in excess of 20 feet long (Taylor 1965). It, like most pet boas, are tropical species and, therefore, might not range far into the more temperate highlands in Hawaii, but there are exceptions, and invading species often acclimate to local conditions. Some pythons and other boids prefer wetland habitats (Taylor 1965) and could pose a threat to endangered waterfowl in Hawaii. There are about two dozen boid species commonly kept as pets.

Among the colubrids, a few *Boiga* species are occasionally kept as pets, notably the mangrove snake, *Boiga dendrophila* from Asia. Approximately a dozen species of rat snakes are also popular pet animals. Both temperate and subtropical species are kept in captivity. Some of the temperate species could invade to near tree line and could rapidly cause the extinction of most Hawaiian forest birds, including not only officially endangered species, but many native species not currently considered endangered. *Elaphe* species are good climbers and eat birds, rodents, lizards and frogs (Conant 1975). Native birds within the native range of rat snakes often have evolved elaborate defensive strategies; for example, the red-cockaded woodpecker encourages large deposits of conifer sap around the entrance of its treehole nest, specifically to discourage predation by *Elaphe* rat snakes (Attenborough 1984). Naive native Hawaiian forest birds would be expected to lack such defenses against snakes.

Stowaways:

Many snakes actively seek either daytime or night-time hiding places (Conant 1975), as well as refuges for digesting meals. They often stay in hiding a week or more after a meal (Taylor 1965). These behaviors make many species frequent stowaways especially in cargo holds and containers. The brown tree snake, *Boiga irregularis*, is thought to have entered Guam in this way, and several animals have been caught in Hawaii and other Pacific and Indian Ocean islands (Fritts & al. Subm.). The venomous *Pseudonaja textilis* is thought to have been introduced into New Guinea by W.W.II traffic from eastern Australia (Slater 1968). *Dendrelaphis caudolineatus* from southern India, Malaya, and Indonesia is an active diurnal arboreal predator that has been intercepted in shipments as far away as Saipan and Pohnpei. Its more tropical distribution suggests that this species might do well in the lowlands on Maui, but probably would not invade the coolest and wettest forests.

Lycodon aulicus is a nocturnal arboreal predator from southern Asia and Indonesia with a propensity to travel with humans. It became established Réunion in the early 1800s presumably imported from India in bales of rice (Cheke 1987) and by the 1870s had also established on Mauritius (Cheke 1987). On Réunion, it was blamed for the near extinction of native day-geckos (Cheke 1987). It recently established on Christmas Island in the Indian Ocean (Fritts 1993) and has been intercepted on Pohnpei in a shipment of Philippine lumber. Leviton (1965) believed that *L. aulicus* also was introduced to the Philippines and Indonesia within the last 200 years. Its closest relative, *Lycodon capucinus* with which it is often confused, is a domestic species in Southeast Asia where it preys preferentially on house geckos (Taylor 1965). Thus, *L. capucinus* would also be susceptible to travel in household goods and especially containerized cargo. In Thailand, native *Lycodon* species live as high as 2300 meters in the mountains (Taylor 1965), which would have a similar environment to the upper limit of Hawaiian forest birds on Maui. All *Lycodon* species are relatively small, barely reaching one meter in length, and they are agile tree climbers (Taylor 1965).

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BIRDS:

Birds are notorious invaders of natural ecosystems on both continents and islands (Ebenhard 1988; U.S. Congress 1993). Two factors are responsible: First, their warm bloodedness, great mobility, generalist food requirements, behavioral plasticity, and relatively high tolerance to environmental extremes make many species superior competitors. Second, they are considered aesthetically and culturally important, and as different human cultures have migrated to new areas, they have taken representatives with them. Worldwide, over 200 species have been purposefully introduced and successfully established in 771 new areas (Ebenhard 1998). Fortunately for agriculture and natural areas, most introductions failed to establish. These 771 "successes" are a fraction of the total attempted; in Hawaii over 150 species of birds were introduced, of which 46 successfully established (Miller & Eldredge 1996). Many of these 46 species are invasive, spreading alien plants and bird diseases, competing with and preying on native species, and altering ecological processes in native and disturbed habitats (Cuddihy & Stone 1990). The acclimatization societies responsible for most of the historic introductions are no longer active; and the major source of alien species currently is escapes and releases resulting from the pet trade. For example, 22,000 birds were brought into Hawaii in 1989 mostly for the pet trade (US Congress 1993). This change gives additional bird species the opportunity to invade new areas. One of the most popular taxonomic groups among bird fanciers is the parrots and their relatives (Psittaciformes). Ebenhard (1988) found that parrots were

disproportionately well represented among the successful colonizers with 28 (13%) of the species and 61 (8%) of all introductions being parrots. Fourteen species are established in the continental US, the second largest group after game birds (Nilsson 1981). In contrast, none are well established in Hawaii, but that could change as a number of small flocks of several species are feral. Furthermore, increasing pressures by the pet industry may allow more to enter. Thus, the potential impacts of parrots are reviewed here.

Introduced birds, like other groups, are usually most successful in habitats similar to those exploited in their native land, and most early introductions were species adapted to live in human disturbed habitats in their native area. Thus, many alien birds have not invaded natural areas (Ebenhard 1988; Usher & al. 1988). However, many parrots in the pet trade are forest birds, and if these escape, they can be expected to invade native forests. Parrots feed on fleshy plant parts, especially fruits and seeds. In North America, the invading monk parakeet has stripped buds, flowers and fruits from favored trees, severely affecting growth and survival of some native trees (Ebenhard 1988). Some endangered Hawaiian plants may be vulnerable to this sort of depredation.

In Hawaii, parrots would be a major new factor in the spread of invasive plant species. They are capable of feeding on larger fruits than other established birds and could distribute larger seeded plants out of gardens into native forests. They are also strong fliers and could more rapidly spread alien seeds into the most remote habitats, crippling weed control efforts. These new alien plant species could compete with native species, driving some to extinction. For example, pigs and pheasants are the important dispersers of banana poka, an invasive liana in Hawaiian forests (Cuddihy & Stone 1990). Neither of these groups disperse far after feeding. An invasive parrot could change the rate of spread, distribution, and invasiveness of the plant.

Alien birds are recognized as major reservoirs for bird diseases (van Riper & van Riper 1985); parrots would significantly increase the threat of diseases to endangered birds. Also, since an increasing proportion of parrot introductions is illegal, there is an increasing threat of new diseases being introduced. In the 1970s, the introduction of the devastating Newcastle disease of birds into the US was traced to a shipment of illegal parrots from Mexico. Only severe quarantines and eradication programs prevented the disease from spreading and becoming firmly established (Nilsson 1981). In Hawaii, Newcastle disease would result in massive declines or extinctions of the remaining endemic birds if it became established. The threat posed by parrots, especially the import of illegal birds, is real.

Nearly all parrots nest in cavities; and all but one of the 28 introduced parrot species nest in cavities (Ebenhard 1988). Since there are no other large cavity builders (e.g., squirrels and woodpeckers) in Hawaii, nest sites may be limiting, and most parrots may require a long lag period before becoming invasive. However, they can make their own cavities and, over time, could become invasive.

Parrots and other alien birds can arrive on flights from anywhere. In the 1970s Japan supplied a minute portion of the imported pet birds to the US, but during the same period the country was a major importer of tropical cage birds (Nilsson 1981). Increasingly, illegal shipments are using complex circuitous routes and devices to escape detection (Anon. 1995).

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FORMICIDAE:

Ants are notorious invaders, and recognized as a cause of native species extinctions, both in Hawaii and elsewhere (Cole & al. 1992; Gillespie & Reimer 1993; Hölldobler & Wilson 1994; Reimer 1994; Wilson 1996). About 40 species are established in Hawaii (Nishida 1994), and those with large, aggressive colonies are the most problematic (Howarth 1985; Reimer 1994). There are numerous alien ant species that could invade new habitats or attack different prey if they became established in Hawaii. Two examples are described: The fire ants, which are currently serious invaders of southern North America, and

the weaver ants, which are dominant forest canopy predators in the old world tropics and subtropics.

Fire Ants:

Two species of fire ants were inadvertently introduced from South America to the Southeastern US: *Solenopsis richteri* about 1918 and *Solenopsis invicta* about 1940, and both have become problem invasive species (US Congress 1993; Callcott & Collins 1996). *Solenopsis invicta*, especially, has been implicated in the extirpation of native species in areas where it has invaded. *Solenopsis* nest in the ground, usually in open habitats and open woodlands. If these warm temperate species established on Maui, they probably would invade at least low and mid-elevation dry forests and open country. Their upper elevation limit is unknown, but their subterranean nests are protected from most frosts. The open alpine dry shrublands in Haleakala National Park appear to provide an ideal habitat for these species, but the cool temperatures might limit their distribution near the summit and within the crater.

Fire ants are voracious predators of small animals, feeding the protein to their larvae. Few native invertebrates would escape their depredations. Naive ground-nesting birds, such as the endangered Dark-Rump Petrel, would be especially vulnerable, if the ants can survive near the bird colonies. Adult ants also feed on sweets such as nectar and honeydew. Thus, they could disrupt reproduction and survival of native plants and favor invasions of certain alien plants and honeydew producing insects. Many plant and animal extinctions would be expected to occur in the surviving lowland dry forests on Maui, for example those at Kanaio and Auwahi.

Most of the dispersal and invasion of southeastern North America has been by slow outward spread, but there have been jumps probably the results of human aided transport. Between 1975 and 1983 *S. invicta* became established in Puerto Rico, possibly in used oil field equipment shipped from the U.S. (Callcott & Collins 1996). A colony of *Solenopsis invicta*, was intercepted in Honolulu in a package from Texas in 1991 (CGAPS 1996). As the species expands its range in North America, it will have greater opportunity to be transported to Hawaii. *S. invicta* reproduce in two ways: individual fertile queens establishing new colonies, and polygyne (multiple-queen) colonies splitting and part of the colony walking to a new nest site (Shoemaker & Ross 1996). Polygyne colonies pose a greater invasive threat and are more likely to establish if transported, but they are also far less likely to disperse long distances. In fact, it is highly improbable that a polygyne colony would arrive on Maui by plane, except by the unlikely inclusion of a colony in soil, such as in a containerized shipment or soil on earth-moving or construction equipment.

Fertile females, on the other hand, could become stowaways in planes, in cargo, and containers. Their mating swarms could fly near packing areas or even airports, increasing the likelihood of gaining access to shipments. Such transported mated females would probably have shed their wings by the time of arrival and, therefore, would most likely only be able to establish near their site of disembarkation.

Weaver Ants:

The Asian arboreal weaver ant [*Oecophylla smaragdina* (Fab.)] is widely distributed from Asia to Australia, where it occupies a wide range of forest habitats from savanna and monsoon dry forests to more mesic habitats and rain forests (Hölldobler & Wilson 1994). A closely related species lives in Africa. Weaver ants use their larvae as spindles to weave nests in the canopy, and their ability to select an optimal environment within the canopy for their nests gives the species a wide tolerance for different forest types. Given its known distribution and preferred environments, it would be able to invade all forested habitats on Maui except perhaps the wettest rain forests and the coldest sites.

The ant is a voracious arboreal predator, which can exclude all sensitive animals from its nest tree as well as closely neighboring trees. Colonies can contain 500,000 or more workers, and control a territory of a dozen or more large trees (Hölldobler & Wilson 1994). They control the entire tree surface from the ground up and kill virtually all animals found within their territory (Hölldobler & Wilson 1994). Few birds would be able to nest or forage near an active ant nest. Thus both native invertebrates and several native forest bird species, as well as the endangered tree-roosting native bat, would be severely affected, and the extinction of many currently listed species as well as many currently non-endangered species would be expected if this species established on Maui.

The weaver ant has been introduced to south Pacific islands for biocontrol of palm pests (Greenslade 1965). However, its effects on either the intended target or potential nontargets have not been recorded. It could be introduced into Hawaii illegally by well-intentioned gardeners returning from Asia. Less likely is the possibility that fertile queens could arrive as stowaways in aircraft or in shipments of cut flowers or other plant material. The exceptionally complex behavior makes weaver ants popular research animals. The related African species is established in entomological laboratories in the US (Hölldobler & Wilson 1994) and could be moved to Hawaii. Hölldobler & Wilson (1994) describe a method to transport small colonies within hand luggage on aircraft.

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CULICOIDES (Family Ceratopogonidae):

Biting midges in the genus *Culicoides* are important veterinary and public health pests in most areas of the world (Linley & Davies 1971). There are over 1000 valid species, and many more still to be discovered and described. Over 40 species are known from Japan and Korea (Arnaud 1956; Wirth & Hubert 1989), 168 species from Southeast Asia (Wirth & Hubert 1989), and about 135 from North America (Wirth 1965). The biology of most species remains unknown. The larvae are predators or scavengers on tiny invertebrates in semi-aquatic and aquatic habitats; larval substrates include damp rotting plant material, animal dung, mud, and soil in tree holes, compost heaps, rotting

vegetation, margins of water bodies, and a variety of aquatic habitats (Jamnback 1965; Howarth 1985b). Each species prefers particular larval habitats, and in concert most potential larval substrates are exploited. Adult females of many species are specialized to suck vertebrate blood: some generalists, some attacking birds, others small or large mammals, etc. (Jamnback 1965). They are important transmitters of diseases, including blood protozoans (especially the primitive bird malarias), filarial worms, viruses, and other parasites among birds (Kettle 1965; Wirth & Hubert 1989). In addition, they also would increase the spread of mechanically transmitted diseases of birds (e.g., avian pox). Adult females of most species are readily dispersed by wind (Linley & Davies 1971) and attracted to lights at night (Howarth 1985b). *Culicoides* are very small; most adults are less than 2 mm long. Unless the species bit humans (which many do) or otherwise became conspicuous, their impact on endangered birds would go unnoticed until too late. To illustrate the potential impacts of these alien species on Maui, the potential threats posed by two species will be described: *Culicoides arakawae* and *C. obsoletus*.

Culicoides arakawae

Culicoides arakawae is widespread in Asia from Japan south to the Indonesian islands and west to India (Arnaud 1956; Wirth & Hubert 1989). The species does well in both tropical and temperate climates, but whether its range results from different strains is unknown. Arnaud (1956) reported it to be the most abundant and widely distributed *Culicoides* in Japan. It breeds in mud and soil at water margins, especially where polluted, such as animal wallows, ditches, flumes, streams, and pools (Kitaoka & Morii 1963; Howarth 1985b). Near Tokyo, the species has two to three generations per year with a minimum life cycle of 30 days (Kitaoka & Morii 1963). The species probably can breed continuously in the tropics; adults were collected in most months of the year in Laos (Howarth 1985b). The adults readily attack birds and sometimes mammals (Arnaud 1956), and the species is considered to be the most important vector of the bird protozoan parasite *Leucocytozoon caulleryi*, a serious disease of poultry in east Asia (Kitaoka 1978) and fowl pox virus (Fukuda & al. 1979). Fowl pox is already recognized as a severe disease among Hawaiian endangered birds (van Riper & van Riper 1985); thus the establishment of an efficient new vector would pose a significant new risk. Adult *C. arakawae* are readily attracted to lights (Arnaud 1956) and are easily tra ported on the wind; they are, therefore, potential stowaways on aircraft de, arting from infested areas at night.

Female *C. arakawae* deplaning at Kahului would find abundant ideal suitable breeding habitats in the immediate area surrounding the airport, both at Kanaha Pond and in the irrigation ditches and pools in and near cane fields.

From these lowland habitats the species could easily disperse on the wind to rain forest habitats on both east and west Maui. The endangered water fowl at Kanaha Pond and other wetlands could be severely impacted both from exsanguination and from exposure to new diseases. Breeding habitats may be more limited in the upland rain forests, except for pig wallows and some natural pool margins; however, the species could adapt over time to breed in the constantly moist soil in the wet forests of Hawaii. If it did become abundant, it would cause the declines of several native forest birds.

Culicoides obsoletus

Culicoides obsoletus is one of the most widespread species of biting midges, occurring in north Africa, Eurasia and North America (Jamnback 1965). It is recorded from both South Korea and Japan, where it is widespread on Honshu and Hokkaido (Arnaud 1956). In North America, it is found from southern Canada to North Carolina and Tennessee in the east and from British Columbia and Alberta to northern California in the west (Jamnback 1965). It is a serious pest of humans and animals on Hokkaido (Arnaud 1956) and in North America (Jamnback 1965). Larval breeding substrates include damp terrestrial habitats, shaded seeps, moist straw, decaying spruce needles, cornstalks, soil polluted with chicken or horse manure, straw mixed with cow manure and moist substrates in sphagnum bogs and marshes (Jamnback 1965). There are two generations a year (Kitaoka & Morii 1963).

The wide range of larval breeding habitats indicates that the species could become invasive in Hawaii. Suitable breeding habitats on Maui include Kanaha Pond and the cane fields near the Kahului Airport, as well as the moist forest floor in the rain forests. If overwintering larvae diapause, they would not be successful in lowland habitats, but this species would probably survive very well in cool upland forests where the major populations of endangered forest birds survive. Emerging females do not require a blood meal to develop their first clutch of eggs, making establishment of colonizers more likely but perhaps decreasing their role in disease transmission. In suitable habitats, they can become incredibly abundant, severely worrying their hosts. Like *C. arakawae* adult *C. obsoletus* are readily attracted to lights and are easily transported on the wind; they are, therefore, potential stowaways on aircraft departing from infested areas at night. Additionally, immatures of this species could be inadvertently imported on sphagnum or other moist materials used to pack shipments of living organisms and cut flowers.

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MELASTOMES:

The plant family Melastomataceae, of which there are no native members, is notorious in Hawaii for its invasive potential (Plucknett and Stone 1961). Of 15 species introduced to Hawaii, 14 have escaped from cultivation (Wagner & al. 1990). At least five have become disruptive invaders , and three -- *Miconia calvescens*, *Clidemia hirta*, and *Tibouchina herbacea* -- are among Hawaii's worst invasive plant pests. Although further introductions from the family have been officially banned, there are about 4,500 species in the family, most of which may be potential invaders. The woody genera *Miconia* (1000 species), *Clidemia* (175 species), and *Tibouchina* (250 species), all native to the Neotropics (Cronquist 1981) probably pose the greatest threats. Most of them have striking leaf-venation and fruit prolifically, so there is certainly much potential for ill-informed or ill-intentioned "ecotourists" to nature reserves of the Neotropics to bring back seeds to grow in wet, tropical

environments of Maui. For example, La Selva, a 1500-acre reserve in Costa Rica at 100-3000 m elevation has 25 species of *Miconia* and 13 species of *Clidemia* (Gentry 1990). Any one of these would be very likely to establish and spread on Maui if introduced. Any one of them, released from its natural enemies, could prove to rival *Miconia calvescens* or *Clidemia hirta* in invasiveness.

The invasive melastomes are understory plants capable of growing in dense thickets that allow virtually no other plant to grow beneath their shade. Their effects on the native forests are devastating; the structure of the forest is changed, with the native understory plants, their associated insects and other organisms eliminated (Cuddihy & Stone 1990).

Although the species now in Hawaii were introduced as ornamentals, the rise in travel opportunities and ecotourism could provide additional avenues for dispersal. Many species (e.g. *C. hirta*) have fruits filled with tiny sticky seeds that are easily transported on boots and other clothing of hikers. Visitors from infested areas could unwittingly transport seeds of one or more species with them.

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APPENDIX H

EFFECTIVENESS OF POTENTIAL MITIGATION MEASURES FOR SELECTED INVASIVE ALIEN TAXA

EFFECTIVENESS OF POTENTIAL MITIGATION MEASURES FOR SELECTED INVASIVE ALIEN TAXA

Prepared as part of the Biological Assessment for the
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for

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Hawaii Biological Survey
Technical Report No.
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APPENDIX
SECTION H
MITIGATION MEASURES FOR SELECTED TAXA

To provide specific details on how the potential mitigation measures outlined in Section H might be implemented, the proposed measures will be discussed in relation to each of the taxa described in Section F.C. For each of the selected taxa, the relative effectiveness of each procedure in Table H-1 is given in Table H-2. These mitigation measures are analyzed in this section primarily on their biological merits, which will sometimes conflict with feasibility or legal constraints. Concerning legal constraints, in May 1977, President Carter authorized Executive Order 11987 (42 Fed. Reg. 26949; 24 May 1977, Page 9) which requires all federal agencies, to the extent allowed l law, to prevent the introduction of harmful alien species into any natural ecosystem in the US. This order could provide an additional aegis for collaboration on alien species issues among federal agencies involved with the Kahului Airport. Concerning legal constraints in the international arena, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) is a possible model for regulation of the international movement of alien species (US Congress 1993), especially for the species that overlap (for example, many smuggled parrots are endangered and listed in CITES). However, the narrow focus on trade, the lack of good data, and political climate in many countries hinder the effectiveness of CITES.

The following discussion on potential mitigation procedures and opinions are largely my own. Time constraints prevented review of this draft by members of the Biological Assessment Technical Panel. Many of these solutions arose out of discussions at the meetings, but any errors, speculations, and omissions are mine.

SNAKES:

Purposeful introductions of nearly all vertebrates, including the examples of snakes and parrots in Table H-1 can be regulated and addressed similarly; therefore, they are treated together here. Purposeful introductions fall into two distinct categories: legal introductions and illegal introductions. Legal introductions, by definition, include those that have appropriate documentation and are declared at the port of entry. These require inspection and quarantine measures that are stipulated by law, but their regulation is outside the purview of this mitigation. The second category of purposeful

introductions is the illegal or smuggled introductions, and these represent a possible major quarantine problem at Hawaii's airports. The following describes the possible effectiveness of the more appropriate proposed mitigation measures for intercepting smuggled organisms.

Smuggled vertebrates:

Pre-entry procedures

- Pre-entry procedures to stem the tide of illegal introductions should include education programs aimed at the importers and smugglers to show the dangers to the Hawaiian environment as well as the penalties inflicted on smugglers. These need to be vigorously implemented, and the penalties well publicized to be maximally effective.
- Interagency agreements would be effective in having inspection personnel alerted to the potential for smuggling of alien vertebrates. These include customs people and airline personnel, who need to be alert for and report suspicious packages or suspicious activity to the appropriate authorities.
- Pre-treatment, control of landscaping, pest free certification, limited flights from high-risk areas, and prohibiting foreign flights to Kahului Airport would probably not add to the effectiveness of catching smuggled vertebrates.
- Inspection of all baggage at foreign airports, particularly when the inspectors are alerted to the possibilities of contraband vertebrates and other harmful organisms would be highly effective, and potentially result in nearly 100% interception. Many foreign ports already require thorough inspection of baggage for security reasons, so the method is theoretically feasible. US airports also prominently display the sign: "... ALL BAGS ARE SUBJECT TO SEARCH" "This includes CHECKED and CARRY-ON bags ... "
- Coordination of Federal and State Pre-Clearance Programs at Vancouver and elsewhere would be beneficial for intercepting smuggled vertebrates, including snakes and parrots.

Port of Entry Measures:

- The planned increased inspections are necessary and effective. Trained dogs have proven highly effective in intercepting snakes and other organisms for which they have been trained. Quarantine facilities would be necessary only if the amount of traffic or interceptions proved to be significant.
- The training program for airport employees would be potentially highly effective.
- Quality control and inspection procedures would be important in improving the efficiency of this program. Included here is the measure to conduct investigations of potential gaps, such as when contraband smuggled species are intercepted. Investigations are urgently needed to determine

whether the smuggling incident is an individual circumstance or part of a larger illegal activity, with additional species being introduced.

- Development of a data base will assist the implementation of several different measures, by making pertinent information available when needed.
- Scheduling airline flights would be helpful but not critical if sufficient inspectors and facilities were available to handle the incoming traffic.
- Banning cargo from high risk areas would not be effective for smuggled vertebrates.
- The establishment of an alien species airport committee would complement the cross-training for airport employees and would be a positive step.
- Controlling landscaping, early detection and response measures would not be appropriate or applicable to smuggled vertebrates since most successfully smuggled organisms would quickly be taken from the airport environs by the smuggler.

Stowaways:

Snakes and certain other small vertebrates can also enter Hawaii as stowaways through the airport, and this provides a completely different problem than smuggling. The following describes the possible effectiveness of the more appropriate proposed mitigation measures for intercepting stowaways.

Pre-entry procedures

- Pre-treatment is not currently effective for stowaway snakes, although repellents are being researched.
- Education programs may be highly effective in cross-training airline personnel and inspectors of the potential for stowaways. This complements the interagency agreements as well.
- Controlling landscaping at foreign and domestic airports could potentially lessen the potential for stowaways. The storage of open cargo containers in areas frequented by snakes and other cryptic animals may allow the entry of stowaways. Snakes have moved onto the tarmac at Guam and entered aircraft landing gear apparatus. Minimizing refuges for snakes near container handling facilities and near aircraft loading docks will minimize stowaways. The current perceived source airports in north temperate regions of Korea, Japan and Canada mean that stowaways will be only a seasonal problem. Obviously, most species are not likely to be active during the winter months.
- Stowaways are also not likely to be a problem unless there is a population irruption near the source area. The development of a data base giving pest status at source areas will complement other mitigation measures.

- Interagency agreements, training of travel industry and airport personnel and occasional inspection by HDOA or USDA animal control staff will also help minimize risk.

Port Of Entry:

- Effective Port of entry measures for stowaway vertebrates include increased inspection of incoming cargo and aircraft, especially when the risk is high (see the pre-entry procedures). Many flights will be low risk and not require additional inspection, such as those from north temperate areas in winter, or where it is known that the source airport is well secured with little chance of stowaways.
- Training program would be beneficial.
- Monitoring Kahului Airport and environs would be appropriate especially to locate existing refuges and hiding places for arriving stowaways, and to be better prepared if a stowaway is found.
- Quality control of inspection procedures and efficiency would be helpful in this aspect.
- Establishing a data base would be very important to quickly obtain information on risk to facilitate efficient inspections.
- If data are not adequate, banning high risk cargo from some areas may be necessary.

Early Detection and Response:

- If an invading snake is discovered in the airport environs, it will be important to respond quickly. This requires a contingency plan and a rapid response team with members roles worked out in advance.
- The immediate goal would be to assess the population status of the invader with a monitoring and control program, that is designed to eradicate the incipient population. Eradication may be possible, if the invasion is caught early.
- Discovery of a loose stowaway indicates a breach in the inspection and containment program. To best design improvements to plug the gap, accurate information is needed on how the organism arrived and escaped. For that a thorough investigation is needed.

BIRDS: PARROTS:

Parrots enter Hawaii as caged birds for the pet industry. Legally imported birds are a separate problem. Measures designed to minimize the risk of illegal importations of birds to Kahului Airport are similar to those described for purposeful introduction of snakes above. It is highly unlikely that parrots or other birds would enter Hawaii as unnoticed stowaways on aircraft. Many parrots are protected by CITES, and smugglers will go to great

lengths to hide their contraband, for example, sewing live eggs into their clothing.

FORMICIDAE: ANTS:

Pre entry procedures:

- Pre-entry methods are likely to be highly effective in preventing the introduction of ant species. Monitoring for highly invasive, aggressive colonies of ants near overseas airports and packing facilities is strongly recommended. Fire ants and weaver ants have conspicuous large colonies, as do many other problematic ants (such as, *Pheidole* and *Ochetellus).* Such a program would not need to find every small colony. Removal or control of the large colonies within a set distance of the source areas during their reproductive period will suffice. It is the large nuptial flights and dispersing budding colonies that need to be stopped, and for most species these are highly seasonal. Small, insignificant colonies in the airport environs near the source areas would pose much less of a problem. These monitoring programs could be seasonally determined for each source area and problematic ant species because the nuptial flights are very predictable based on environment and climatic factors.
- Landscaping at the ports of origin would also be effective to minimize the possibility of stowaways entering the containers or aircraft. The arrangement of electric lights can discourage or minimize the chances of nuptial queens being attracted to the lights on aircraft or near shipping containers and therefore minimize the chances of stowaway queens on the flights. This latter method will also work for many other nocturnal pestiferous insects.
- Shipments of high risk material that could harbor a colony of ground-inhabiting ants (soil, lumber, or material with a lot of open spaces) should be inspected and treated or refused entry.
- Educational programs aimed at shippers and agricultural personnel to alert them to the problems of invasive ants. These are agricultural pests at well, so that there should be economic and political support for such programs.
- Transport of ants on passenger baggage is far less likely, except as smuggled curiosities in ant farms and the like. Judicious use of the declaration forms and screening and inspection at disembarkation is justified. I suspect that the risk is low, but without data its dangerous to assume. Ant farm kits are popular and sold both here and on the mainland.
- A small colony of the weaver ant could be introduced by an organic gardening enthusiast or a research laboratory interested in behavior or chemical physiology. It is hoped that the declaration forms and inspection will intercept these avenues.

Port of Entry:

- Alien ant species will arrive in Hawaii. It is a certainty that the red fire ant, *Solenopsis invicta,* will continue to be intercepted as long as it remains in its invasive phase on the mainland. Fortunately, it and many other ants have conspicuous colonies that can be watched for. Therefore, vigilant monitoring programs are necessary to detect invading ant species in the airport environs and where containerized shipments and high risk materials are unpacked.

Post entry:

- Colonies are likely to remain small and localized for an extended period of time until they are large enough to reproduce. It should be possible to detect incipient colonies while still small enough to eradicate. For example, several ant species were first detected near Hickam Air Force Base and Honolulu International Airport: that is, probably near their point of establishment. Had they been eradicated at the time of discovery, we may have prevented their invasion. These include the long legged ant, *Anopolepes longipes* and *Ochetellus glabra.* Also fitting this description is the colony of Argentine ant at Haleakala National Park, which was detected early during its invasion phase and could have been destroyed in the 1970's when it first arrived. However, it was already well established on other areas of Maui by that time.
- Colonies of the weaver ant are conspicuous and unmistakable. If it moves into suburban and urban gardens near Kahului Airport, homeowners will be very eager to report it! Trees with colonies can be treated, and early infestations may be eradicatable. Once the population is large and has moved into more remote areas, eradication may be impossible.

***CULICOIDES* SPECIES:**

Adult Midges As Stowaways:

Pre Entry:

- Adult biting midges mosquitoes, sand flies, and many other small flies are relatively sensitive to knockdown pesticides. Therefore, treatment of aircraft, cargo holds, and shipping containers before they are loaded would be effective in reducing the risks of invasion by these and many other harmful species. Some research is needed to find safest methods for various commodities and source areas, and such treatments would need to be approved by appropriate agencies. Even harmless soap solutions, mineral oil formulations, or other relatively nontoxic compounds might work in most situations.

- Treating or removing potential breeding and resting sites by landscaping in the environs of airports and container packing facilities would significantly lessen the chances of stowaway invertebrate pests.
- Treatment of lights at airports in the vicinity of loading docks and at packing facilities is recommended. Many pest arthropods, including most mosquitoes and biting midges, are attracted to lights. If an open cargo hold is lighted in an otherwise darkened airport, many flying insects will enter the aircraft.
- Fortunately, adults are highly seasonal in temperate areas, and precautions are only needed for relatively short time each year.

Port of Entry:

- Cooperation should be sought from air personnel on incoming flights to watch for alien species. Although biting midges would be difficult to detect this way, the presence of other species could indicate a breach of quarantine. Furthermore the introduction of many other harmful species can be prevented.
- Landscape modification within the airport environs will reduce the likelihood of establishment of biting midges. Adults require humid protected areas to rest and suitable breeding sites in which to lay eggs. Sites include damp vegetation and ground, rotting plant material and pools of water. Suitable sites can be used as traps and treated to prevent establishment, or such sites can be removed. For example, table salt can be added to water pools to make them unsuitable for mosquito and biting midge breeding.
- Treatment of lights within the airport is recommended. During the BAT panel's inspection trip to Kahului in November 1996, high populations of alien mosquitoes and crane flies were noted in the restrooms. These flies were attracted inside by the electric lights and perhaps the higher humidity there. Stowaways would also be attracted to conspicuous lights, where they could be safely controlled. Control of flies in restrooms also benefits sanitation.

Post Entry

- Monitoring the airport periphery with light traps to detect midges and other nocturnal flying pests is a possibility. It is labor intensive and a long shot, but if it is combined with monitoring for other species, it would be worthwhile.
- The attractiveness of nocturnal pest insects to lights could be turned to advantage for early detection and control. When Kahului Airport is closed, only certain lights are usually left on for security. These lights could also function to capture and destroy night-flying insects in the airport environs.

Immature Midges in Breeding Habitats:

Pre Entry:

- Damp absorbent material (such as sphagnum, other mosses, and wood chips) used to transport cut flowers and other fresh plant and animal material can harbor immatures of biting midges as well as many other pests. Some *Culicoides* aestivate as dry immatures and can rehydrate and emerge when moistened. This strategy allows for efficient long-distance dispersal in untreated material. Larvae or other immature stages are likely to be found in breeding substrates at any time of the year, even in the temperate region. *Culicoides obsoletus* is thought to over winter as larvae. Therefore, the risk may not be seasonal, unless the shipment is treated or other precautions are taken.
- Treatment of this packing material before use is recommended. Treatments could include heat, dipping or washing with soap solution, or fumigation. Certification that organic packing material is free of pests would further reduce the risk.

Port of Entry:

- Suspected substrates should be looked for during inspections and treated if necessary.
- High risk material also may include fresh cut flowers and other living plant material, particularly from high risk areas. Larval biting midges have been intercepted in Hawaii in bromeliad leaf axils, a known habitat for some *Culicoides* species. The recent arrival of the mosquito, *Wyeomyia mitchellii*, is suspected of having been introduced with bromeliads from southeastern North America. A number of plant-feeding insects remain closely associated with their host; some are sessile like the scale and white fly on the stems, flowers, leaves, and fruits of plants.
- Other measures are listed in Table H2 and similar to the descriptions given for the ants.

Post Entry

- Organic packing material from high risk areas should be treated before disposal on Maui. This can be accomplished by heat, submersion in insecticidal or soap solution, or by fumigation. Heat (hot water dip) would probably be the cheapest and safest.
- Given the tiny size, cryptic behavior and high mobility, Culicoides are probably very difficult to control or eradicate once they become well established. Therefore, greater reliance must be placed on prevention.

MELASTOMES:

Weedy melastomes can enter Hawaii in two ways: purposefully for their ornamental value and inadvertently as stowaways, especially on clothing.

These two modes of travel present different problems for quarantine and interception measures.

Purposeful Introductions

Pre-entry measures

- Education programs aimed at nursery-men, returning residents and ecotourists are the first line of defense in preventing the introduction of harmful alien weeds into the Hawaiian environment. Commercial nurseries possibly bring in more material and are the main group of concern. The well-meaning public sometimes naively carry propagative material of pretty weeds with them when they return from overseas.
- Interagency agreements would be very effective in limiting the purposeful introduction of melastomes and other undesirable weedy plants.
- Landscaping at overseas ports would be helpful. Known noxious weeds should not be grown in the public access areas of the airport environs. Well meaning or naive people pick a "pretty plant" and naively import it to Hawaii on a whim.
- Inspection of all baggage at foreign airports would intercept most of the larger volume shipments, but since the fruits of melastomes are often small, those carried by individuals would probably escape detection.
- Pre-clearance activities would probably be beneficial in coordination with the assistance of other agencies and travel industry personnel.
- New methods are needed to intercept contraband fruits and propagative plant material.

Port-of-Entry Measures:

- Inspection, including the use of trained dogs, will be important for larger volume shipments.
- Contraband in the incidental baggage brought by individuals will be much harder to detect with current technology.
- Training programs for airline employees might be effective.
- Quality control and investigation procedures in determining what routes are used by the weeds to gain access to Hawaii is especially important, so that these gaps can be closed.
- The Data base will assist greatly in doing this.
- Public education measures may be the most important.
- Inspection of hiking boots and clothing of visitors arriving from high risk areas. Australia requires visitors to wash mud off their boots and clothing before clearance from the customs area.

Post Entry

- Monitoring and vigilance at nurseries on Maul is important.

TABLE II-1
PROPOSED MITIGATION MEASURES

Measure	Responsible Agency	Alien Species Group[a]
Pre-Entry		
1. Pre-Treatment of Aircraft	USDA/Airlines	Effective against flying and crawling insects and arthropods
2. Education of Public on alien Species	HVCB/HDOA/Airlines	Effective against all alien species groups and accidental and purposeful introductions
3. Interagency Agreement on Alien Species Inspection at Foreign Airports	USDA/State Department	Effective against all arthropods and small reptiles
4. Control Landscaping at Foreign Airports	Unknown	Effective against arthropods
5. Pest Free Certification	USDA/HDOA	Effective against arthropods
6. Limit Flights From High Risk Areas	U.S. State Department	Effective against all alien species
7. Prohibit Foreign flights at Kahului Airport	U.S. State Department	Effective against all alien species
8. Risk Assessment of Potential Pests	USDA/HDOA	Effective against all alien species
9. Inspection of All Baggage at Foreign Airports	USDA/FWS	Effective against all alien species
10. Need Additional Information on Vancouver Flights	USDA	Effective against fruit, vegetable, and plant alien species pests
11. Coordination of Federal and State Pre-Clearance Programs	USDA/HDOA	Effective against alien species found on fruits, vegetables, and plants
12. Updating FWS and HDOA Pest List (Including DLNR Lists)	USDA/FWS/HDOA	Effective against all alien species
13. CGAPS Education Program	CGAPS	Effective against all alien species
14. Maintain List of Acceptable Alien Species	USDA/HDOA	Effective against all alien species
15. Program and Education for Government Agencies	USDA/HDOA/FWS/NPS/DLNR	Effective against all alien species

Table H-1 Continued

Port-Of Entry		
1. Increase Inspection and Quarantine Facilities	FAA/HDOTA	Effective against all alien species
2. Training Program for Airport Employees to Recognize Alien Species	USDA/FWS/HDOA/Airlines/Others	Effective against all alien species, probably best for arthropods and small reptiles
3. State-of-The-Art Cargo Building to Included USDA/FWS/HDOA/Customs Requirements	HDOTA	Effective against all alien species
4. Improve HDOA Domestic Inspection Facilities	HDOTA	Effective against all alien species on domestic flights
5. Increase HDOA Inspectors/Dogs	HDOA	Effective against all alien species
6. Monitor Kahului Airport Environs for Alien Species	HDOTA/ADC	Effective against all alien species
7. Quality Control of Inspection Procedures and Efficiency	USDA/HDOA	Effective against all alien species
8. Maintain Data Base	USDA/FWS/HDOA	Effective against all alien species
9. Schedule Airline Flights to Maximize Inspector's Schedules	USDA/HDOA/HDOTA/Airlines	Effective against all alien species
10. Ban Foreign Flights	U.S. State Department	Effective against all alien species
11. Ban Cargo From High Risk Areas	USDA/HDOA	Effective against all alien species
12. Dictating Packaging and Cargo Handling Procedures	USDA/HDOA	Effective against all alien species
13. Alien Species Airport Committee	HDOTA/USDA/HDOA/ADC/FWS/DLNR	Effective against all alien species
Early Detection/Response (Limited to Airport Environs)		
1. Monitoring Surveys to Establish Baseline Conditions	HDOTA/HDOA	Effective against all alien species, especially arthropods and plants
2. Establish Rapid Response Interagency Team	HDOTA/USDA/HDOA/ADC/FWS/DLNR/NPS	Effective against all alien species
3. Establish Contingency Fund Linked to Airport Activity or User Charge	USDA/FWS	Effective against all alien species
4. Eradication	USDA/HDOA/FWS/NPS	Effective against all alien species
5. Investigate Breaches in System	USDA/HDOA/FWS/NPS	Effective against all alien species

[1] See Appendix H also.

Acronym Legend:

ADC: Animal Damage Control, Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture
CGAPS: Coordinating Group on Alien Species
FWS: U.S. Fish and Wildlife Service
DLNR: Hawaii Department of Land and Natural Resources
HDOA: Hawaii Department of Agriculture
HDOTA: Hawaii Department of Transportation, Airports Division
NPS: National Park Service
USDA: Plant Protection and Quarantine, APHIS, U.S. Department of Agriculture

TABLE H-2: EFFECTIVENESS OF MITIGATION MEASURES FOR SELECTED TAXA.

Measure	Snakes	Snakes	Birds	Ants	Ants	Midges	Midges	Melastomes/Melastomes
Pre-Entry	Stowaway	Smuggling	Smuggling	Stowaway	Purposeful	Stowaway/Adults	Stowaway/Immature	Purposeful	Inadvertent
1. Pre-Treatment of Aircraft	0	0	0	2	0	3	0	0	0
2. Education of Public on alien Species	1	2	2	1	3	1	2	2+3	2+3
3. Inter-Agency Agreement on Alien Species Inspection at Foreign Airports	2	2	2	3	1	3	2	2	1
4. Control Landscaping at Foreign Airports	1	0	0	2	0	2	0	2	1
5. Pest Free Certification	2	0	0	2	1	1	3	2+3	2
6. Limit Flights From High Risk Areas	2	0	0	2	0	2	0	0	2
7. Prohibit Foreign flights at Kahului Airport	1	0	0	1+2	0+1	1+2	1	0+1	1+2
8. Risk Assessment of Potential Pests	2	2	2	2	2	2	2	2	2
9. Inspection of All Baggage at Foreign Airports	0	3	3	0	3	0	2	2	1
10. Need Additional Information on Vancouver Flights	0	1+2	1+2	1	1	2	2	1	1
11. Coordination of Federal and State Pre-Clearance Programs	1	2	2	2	2	2	2	2	2
12. Updating FWS and HDOA Pest List (Including DLNR Lists)	1	2	2	2	2	2	2	2	2
13. CGAPS Education Program	2	2	2	2	2	1	2	2	2
14. Maintain List of Acceptable Alien Species	2	2	2	1	1	1	1	1	1
15. Program and Education for Government Agencies	2	2	2	2	2	2	2	2	2

KEY: 0 - Little effect; 1 - Somewhat effective; 2 - Good effectivenoss; 3 - Excellent effectivenoss

Table H-2 cont.

Port-of-Entry	Snakes Stowaway	Snakes Smuggling	Birds Smuggling	Ants Stowaway	Ants Purposeful	Midges Stowaway Adults	Midges Stowaway Immature	Melastomes Purposeful	Melastomes Inadvertent
1. Increase Inspection and Quarantine Facilities	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3	2 + 3
2. Training Program for Airport Employees to Recognize Alien Species	3	2	2	2	2	2	2	2	2
3. State-of-the Art Cargo Building to Include USDA/FWS/HDOA/Customs Requirements	2	2 + 3	2 + 3	2 + 3	2 + 3	2	2 + 3	2 + 3	1 + 2
4. Improve HDOA Domestic Inspection Facilities	2	2 + 3	2 + 3	2 + 3	2 + 3	2	2 + 3	2	1 + 2
5. Increase HDOA Inspectors/Dogs	3	3	3	1 + 2	2	0	2	2 + 3	1
6. Monitor Kahului Airport Environs for Alien Species	2	0	0	2	0	1 + 2	1	0	0
7. Quality Control of Inspection Procedures and Efficiency	2	2	2	2	2	2 + 3	2 + 3	2 + 3	2 + 3
8. Maintain Data Base	2	2	2	2	2	2	2 + 3	2	2
9. Schedule Airline Flights to Maximize Inspector's Schedules	2	2	2	2	2	2	2	2	2
10. Ban Foreign Flights	1	0	0	1 + 2	0 + 1	1 + 2	1	0 + 1	1 + 2
11. Ban Cargo From High Risk Areas	2	1	1	2	1	2	1 + 2	0 + 1	1 + 2
12. Dictating Packaging and Cargo Handling Procedures	3	1	1	2 + 3	1	2	2 + 3	1 + 2	2
13. Alien Species Airport Committee	2	2	2	2	2	2	2	2	2
Early Detection/Response (Limited to Airport Environs)									
1. Monitoring Surveys to Establish Baseline Conditions	1	0	0	2 + 3	0	2	0	0	0
2. Establish Rapid Response Interagency Team	3	2 + 3	2 + 3	2 + 3	2	2 + 3	2	2	2
3. Establish Contingency Fund Linked to Airport Activity or User Charge	2	2	2	2	2	2	2	2	2
4. Eradication	3	3	3	3	3	2 + 3	2 + 3	3	3
5. Investigate Breaches in System	3	3	3	3	3	3	3	3	3

BIOLOGICAL OPINION
of the
U.S. FISH AND WILDLIFE SERVICE
for the
KAHULUI AIRPORT IMPROVEMENTS, PHASES 1 AND 2
KAHULUI, MAUI, HAWAII

July 23, 1997

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3108
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

In Reply Refer To: 1-2-97-F-04; JMB/MSS

JUL 23 1997

Mr. Howard Yoshioka
Manager, Airports District Office
Federal Aviation Administration
300 Ala Moana Boulevard, Rm. 7116
Box 50244
Honolulu, Hawaii 96850

Dear Mr. Yoshioka:

This represents the biological opinion (BO) of the U.S. Fish and Wildlife Service (Service) in accordance with Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544; Stat. 884), as amended, (Act) relative to the project plans for the Kahului Airport Improvement Phases 1 and 2 on the island of Maui, Hawaii. The U.S. Department of Transportation, Federal Aviation Administration (FAA) is the lead action agency and the Hawaii Department of Transportation, Airports Division (HDOTA) is the applicant. The consulting firm Edward K. Noda and Associates, Inc. was utilized by the action agency in its environmental compliance documentation. This biological opinion was prepared using the following information: 1) Kahului Airport Master Plan Improvements Draft Environmental Impact Statement dated March 1996; 2) the Alien Species Biological Assessment, dated March 10, 1997 (BA); 3) Project modifications as described in a letter to the Service dated June 24, 1997; 4) Service recovery plans; 5) domestic inspection needs as described in a letter from the Manager of the Plant Quarantine Branch of the Hawaii Department of Agriculture to the Head Planning Engineer of the Hawaii Department of Transportation, Airports Division dated June 17, 1997; 6) site inspections; 7) the biological literature (see Literature Cited section at the end of document); and, 8) other sources of information. Our log number for this consultation is 1-2-97-F-04. Copies of pertinent materials and documentation are maintained in an administrative record in the Service's office in Honolulu, Hawaii.

Consultation History

The Federal Aviation Administration (FAA), as the lead action agency, has been in informal consultation with the Service since 1994. The Service provided comments on June 28, 1994, with regard to the Notice of Intent to prepare the Environmental Impact Statement (EIS)for the proposed

project. The Service provided a letter dated July 10, 1995, commenting on species present at Kanaha Pond within the vicinity of the proposed project but requesting a complete description of the entire project in order to determine potential impacts to protected species. Previous Service correspondence (June 19, 1995) had been focusing on the potential for aircraft strikes involving endangered Hawaiian waterbirds, especially the Hawaiian stilt (*Himantopus mexicanus knudseni*), at Kahului Airport. The Department of the Interior provided review comments on the Draft Environmental Impact Statement (DEIS) for the proposed Kahului Airport Improvements by letter dated June 6, 1996. The Department recommended the preparation of a Biological Assessment (BA), as specified in 50 CFR part 402.12, as the proposed project constituted a major construction activity with the potential to adversely affect federally listed species. The potential for an increase in new alien species getting to Maui associated with the project was raised in the Department's comment letter.

The FAA agreed to prepare a BA and asked for the cooperation of the Service in its development of the BA. The FAA took the opportunity to seek expertise from individuals most knowledgeable about alien species issues and appropriate mitigation. Letters dated August 23, 1996, were sent from the FAA to a variety of individuals asking for their participation on a Biological Assessment Technical Panel (BAT) and for their attendance at the initial meeting on September 19, 1996. This panel of recognized specialists, consisting of Federal and State agency representatives, Maui County, and private organization representatives (Table 5) met on a number of occasions to "brainstorm", review portions of the preliminary draft BA, and exchange information and suggestions. It was clearly stated by the FAA at the outset that the conclusions and recommendations of the BA would be solely those of the FAA since the BAT was not to be used for the purpose of obtaining consensus of group recommendations. The BAT met on September 19, 1996, October 17, 1996 (site visit of the Kahului Airport), November 8, 1996, December 12, 1996, and January 14, 1997.

By letter dated March 11, 1997, the FAA provided the final BA to the Service and requested initiation of formal section 7 consultation. The Service reviewed the BA and determined its sufficiency in a letter dated March 21, 1997. On April 2, 1997, the Service proposed to list the Blackburn's sphinx moth (*Manduca blackburni*) as an endangered species (62 FR 15640-15646). The Service, at the FAA's request, provided a letter dated May 16, 1997, indicating that conferencing, in accordance with 50 CFR 402.10, was not necessary as the proposed action was not likely to jeopardize the continued existence of the sphinx moth and the mitigation measures associated with the project would apply to the sphinx moth.

The Service, in a letter dated June 3, 1997, requested an extension of the consultation time period in order to discuss additional mitigation measures for the project. The FAA, in response to that letter, requested on June 10, 1997, that the additional discussions be accomplished in a timely fashion and agreed to an extension until June 16, 1997, provided that the Service would deliver its biological opinion on or before July 25, 1997.

A meeting was held on June 16, 1997, to finalize project modifications and mitigative features to further improve alien species interdiction associated with the project. The Service confirmed its

commitment to deliver its BO by July 25, 1997, in a letter to the FAA dated June 18, 1997. Revised mitigative measures were provided to the Service by letter dated June 24, 1997.

BIOLOGICAL OPINION

Description of the Proposed Action

The proposed action, as summarized here, is taken from the March 10, 1997, Biological Assessment, the Kahului Airport Master Plan Improvements Environmental Impact Statement dated March 1996, and project modifications identified in a letter dated June 24, 1997, that strengthen mitigation associated with alien species interdiction. The purposes of the proposed actions are to provide the island of Maui with an airport that will have improved airport facilities (including an extended runway, taxiways, and support facilities), reduce operating and maintenance costs, provide a more efficient airfield and airport facility, allow for more efficient use of aircraft by airlines using Kahului Airport, accommodate existing and forecast aviation demand, and improve access to the airport.

Kahului Airport is located on the north shore of the island of Maui, between the West Maui mountains and Haleakala Crater, about two and one-half miles east of the town and port of Kahului, and approximately 20 miles from Haleakala Crater. The Airport boundary presently encompasses approximately 1,447 acres, including Kanaha Pond. Kanaha Pond has an area of approximately 235 acres, and is designated as a State Wildlife Sanctuary and National Natural Landmark.

The direct action area is defined as the Kahului Airport environs and the indirect action area is the remainder of Maui. The Biological Assessment determined that the entire island of Maui was within the action area of the project due to the potential for increased alien species introductions. The Service concurs with this determination since 50 CFR 402.12 defines "action area" as all areas to be affected directly or indirectly by the proposed project, not merely the area within the footprint of the project. Therefore, this biological opinion assesses the impact of the proposed project on all endangered, threatened or proposed endangered or threatened species (collectively, 'T&E species') and critical habitat on the island of Maui (Tables 1 and 2).

The proposed project is divided into three phases to accommodate planning, design, and funding requirements.

Phase I: This phase is scheduled from the present to the year 2002.

The following projects are included in Phase I:

- Land for the Airport Access Road and Interchange (completed)
- Aviation easement for portion of Runway 2 Protection Zone south of Hana Highway
- Runway 2-20 extension to 9,600 feet with associated taxiways and relocated navaids
- Repave and strengthen existing Runway 2-20
- Relocate Vortac (completed)

- Construct West Side Cargo Facilities including Access Road
- Airport Access Road and Fencing
- Perimeter/Service Road and Fencing
- ARFF Training Facility
- ARFF Facility (completed)
- Post Office Ramp Access Road
- Bulk Fuel Storage Tanks
- Underground Fuel Pipeline (Terminal Area only)
- Interim Helicopter Facility
- Utility and infrastructure improvements, including construction of East Ramp Sewer System, installation of underground communications and electrical utilities along Hana Highway, and installation of non-potable water system

Phase II: This phase is scheduled from 2003 to the year 2008.

The following projects are included in Phase II:

- Acquire land (490 acres) for new Parallel Runway and Runway Protection Zones and Realignment of Hana Highway
- Acquire Aviation Easement for Runway Protection Zone south of Hana Highway
- Acquire land for West Side Cargo Facilities
- Construct New Cargo Facility on East Ramp
- Construct additional T-Hangers
- New Scenic Air Tour Facilities
- Commercial Aviation Lease Lots at East Ramp
- Relocate Airline Ground Support Equipment Maintenance Facility
- Expand Ground Transportation Facilities
- Relocate Airline Ground Support Equipment Maintenance Facility
- Expand Ground Transportation Facilities
- Relocate Ground Transportation Facilities in Runway 5 Runway Protective Zone
- Expand Kanaha Beach Park
- Emergency Roadway to connect Alahao Street with old Stable Road
- North Section of East Ramp Access Road
- Extend Perimeter Service Road and fencing around Northwest Side of Airport
- Utility and infrastructure improvements

Phase III: This phase is scheduled from 2009 to 2016 and is not subject to this consultation. Phase III projects will require additional environmental analysis and consultation with the Service.

The following projects are included in Phase III.

- Construct 8,600-foot Parallel Runway 2R-20L and Taxiways, and install Navaids
- Extend Parallel Taxiway for Runway 5-23

- Extend East Side Parallel Taxiway for Runway 2R-20L
- Widen Runway Safety Area for Runway 5-23
- Construct Transient Aircraft Parking Apron
- Construct Additional Air Cargo Facilities on West Side
- Fuel line from Harbor
- Expand New Ground Transportation Facilities
- Expand Passenger Terminal Parking Lot
- Construct East Ramp Access Road from Hana Highway
- Construct Perimeter/Service Road and Fencing around new Runway 2R-20L
- Re-channel Kalialinui Gulch for Parallel Runway
- Realign Hana Highway at northeast end of airport
- Provide lease lot for flight kitchen
- Commercial aviation lease lots

Features of the project intended to reduce the risk of alien species introductions (BA, Section 9):

Pre-entry Measures

1) *Pre-entry Traveler Education about Alien Species.* The applicant will support the Consulting Group on Alien Pest Species (CGAPS) in their educational role of informing the traveling public of the dangers of alien species, particularly in promoting an Alien Species Video acceptable for in-flight viewing.

2) *Notification of New Routes to Maui.* The applicant, as a member of CGAPS, will keep CGAPS informed of any new proposed domestic or international routes to Maui. CGAPS members include the Hawaii Department of Agriculture (HDOA), the U.S. Department of Agriculture (USDA), and the Service.

3) *Treatment of Cargo Holds.* The applicant will develop, with HDOTA, a voluntary program for all airlines serving Kahului Airport using a non-chemical best practical pesticide/pest prevention treatment program for aircraft cargo spaces.

Port-of-Entry Measures

4) *Traveler Education Regarding Alien Species Risks, Quarantine Restrictions, and Penalties.* The applicant shall support efforts by CGAPS and others to adequately and effectively inform arriving passengers of the dangers posed by alien species, the nature of quarantine restrictions, and the penalties for violations. Current CGAPS plans are for this education program to be self-supporting, therefore, funding commitment is not required.

5) *Training of Airline and Airport Personnel in Alien Species Recognition and Response.* A voluntary education program will be planned and implemented by HDOTA that will train airport employees, baggage handlers, airline cabin personnel, and others. This program will

educate these personnel to recognize and report smuggled animals and plants/fruit, stowaway snakes and insects, and new alien species on airport grounds. HDOTA will coordinate the planning of this program with HDOA, USDA, and CGAPS.

6) *Arrival Inspection Facilities.* The applicant will support HDOA domestic arrival inspection by installing a data link between arrival gates and baggage claim, installing one X-ray machine to test the feasibility of inspecting arriving baggage, installing a paging system at baggage claim, and supplying office space, kennels and inter-terminal golf carts as necessary. HDOTA will furnish the infrastructure and support to adequately meet the USDA inspection needs for international arrivals.

7) *Additional Agriculture Arrival Inspectors.* The applicant will fund one additional inspection dog and three additional agriculture inspector positions, one of which will act as a handler for the dog, bringing the total to eleven inspectors and two dogs. In light of the proposed measures in the project, and with these additional inspectors, HDOA has determined that it will be able to adequately inspect incoming domestic air traffic associated with the project (letter from HDOA to HDOTA, June 17, 1997).

8) *New Air Cargo Building.* The applicant will design and construct a new air cargo building to meet existing and forecast demands, to include an industrial air curtain barrier to prevent escape of any insects during inspection of air cargo containers; offices and facilities for U.S. Customs, USDA and HDOA; lab space, freezer and sterilization/incineration facilities; space for X-ray equipment; and computer equipment and facilities for the HDOA alien species database system.

9) *Quality Control Program.* The applicant will design and fund, on an ongoing basis, a comprehensive program to monitor the efficacy of the alien species interdiction system at Kahului Airport. The program shall be designed in consultation with HDOA, USDA, and CGAPS, and shall be developed and operated by a consultant or agent under the control and management of HDOTA. The program will provide yearly reports to all concerned agencies. These reports shall include summaries of all alien species interceptions from all airport-based operations, their origin and mode of arrival, to the extent possible, and estimates of the efficiency of the inspection system for various taxonomic groups of concern. HDOA will take the lead in developing these estimates which should be based in part on tests of the system (e.g., attempted smuggling, random sampling of passenger effects and cargo, complete inspections of aircraft). The yearly reports shall also include recommendations to improve the efficiency of the inspection system and the quality control program itself. The program will be integrated with the existing USDA Quality Control system for international arrivals.

Early Establishment/Response and Other Measures

10) *Security Committee.* The applicant will encourage the Kahului Airport Security Committee to include alien species control as an element under its purview.

11) *Brown Tree Snake Control Plan.* The applicant will review the Brown Tree Snake Control Plan (Aquatic Nuisance Species Task Force 1996) to determine its applicability to all airports within the State.

12) *Alien Arthropod Detection and Response.* The applicant will, on an ongoing basis, contract with a consultant in entomological pest identification to assist Animal Damage Control (ADC) in conducting semi-annual monitoring of the airport environs to detect early establishment of new alien insects, particularly social hymenoptera (ants and wasps) and biting diptera (midges, flies and mosquitoes). Results shall be communicated to the HDOA and the Quality Control Program. HDOTA will assist HDOA and USDA with manpower, resources and funds in the eradication of any detected population within the Kahului Airport boundary.

Biology and Status of the Species

The purpose of this section is to provide background information for the examination of the effects of the project in the "Effects of the Action" section, below. The most serious potential effects involve introductions of alien species. The effects of alien species have been cited as causes of past decline, and of potential further decline, of all T&E species in Hawaii (Asquith 1997, NMFS 1992, NMFS & USFWS 1996, USFWS 1983b, 1984, 1990, 1992b, 1996a, 1997, in prep. a, b). The Service believes that all presently listed species on Maui could be adversely affected by alien species not yet on Maui. Because the effects of alien species are often similar within groups of organisms that are related and live in similar habitats, this document will use selected taxa to represent groups of listed and proposed species that share such features. Examining these representatives' history, present status, vulnerabilities and responses to alien species and related ecological disruption will provide adequate background for analysis of the potential effects of future alien species introductions.

The island of Maui supports 91 threatened, endangered, or proposed endangered species of plants (Table 1) and animals (Table 2). Of these, nine species are examined in detail in this section. Plants (71 listed taxa) are represented by the Haleakala silversword (*Argyroxiphium sandwicense* ssp. *macrocephalum*) and *Gouania hillebrandii*, which has the only critical habitat declared on Maui. Sea turtles (5 listed species) are represented by the hawksbill sea turtle (*Eretmochelys imbricata*). Waterbirds (4 listed taxa) are represented by the Hawaiian stilt (*Himantopus mexicanus knudseni*). Forest birds (6 listed taxa) are represented by the crested honeycreeper (*Palmeria dolei*). The nene (*Branta sandvicensis*), Hawaiian hoary bat (*Lasiurus cinereus semotus*), dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*), and Blackburn's sphinx moth (*Manduca blackburni*) are

also examined below. The Hawaiian monk seal (*Monachus schauinslandi*) is under the jurisdiction of the National Marine Fisheries Service and is not addressed in this consultation.

a) *Plants*: Seventy-one federally protected plant species, sixty-nine of which are listed as endangered, occur on the island of Maui. These species are found in a variety of community types ranging from coastal, dry, mesic, wet, and bog, to alpine. In addition to flowering plants, ferns and clubmosses are represented on Maui's list of endangered taxa. Eighty-three percent of these plants have populations numbering less than 400 individuals and twenty-six percent of those are represented by fewer than 10 individuals. Refer to Table 1 for a complete list of Maui's endangered plants and estimated populations.

Argyroxiphium sandwicense ssp. *macrocephalum* (Haleakala silversword) and *Gouania hillebrandii* were chosen to represent the federally protected plants of Maui. They were selected because they illustrate various ways that introduced species can adversely affect the survival of native plants.

- Haleakala silversword, *Argyroxiphium sandwicense* ssp. *macrocephalum*

Argyroxiphium sandwicense ssp. *macrocephalum* (Asteraceae) was listed as threatened by the Service on May 15, 1992, (USFWS 1992a) and included in a draft recovery plan in 1996 (USFWS 1996a). This taxon grows as a distinctive rosette and is named for its succulent, sword-shaped leaves and dense silver pubescence. The Haleakala silversword has a highly restricted distribution and is endemic to the island of Maui, only occurring on cinder cones within the crater of Haleakala between 2100 and 3000 meters (seven and ten thousand feet). Almost all individuals are found within the boundaries of Haleakala National Park. Although the plant is assumed to be currently occupying most of its historic range, this was not always the case. By the 1920's, silversword numbers were so depleted that the Maui Chamber of Commerce sent a petition to Washington, D.C., requesting that a serious effort be made to save the species (Loope and Crivellone 1986).

The first reliable quantitative information on Haleakala silversword numbers is from the summer of 1935. In that year 1470 plants were tallied (88 of which were flowering) on a single cinder cone within Haleakala Crater (Lamb 1935). Because about 217 plants were flowering within the crater (Lamb 1935), a reasonable estimate of the total population at that time was about 4000 individuals (Loope and Medeiros 1994b).

Plants have been counted by successive investigators on the cinder cone, Ka Moa o Pele, where the largest number of plants survived in 1935. By 1979, the population on this volcanic cone had increased by a factor of about 4.4, from 1470 to 6528 individuals (Kobayashi 1991). Elsewhere in Haleakala Crater, the silversword has also increased in numbers and extent, with large local populations in areas where few plants survived in 1935. A census of the entire Haleakala silversword population has been attempted four times since 1971, with the following results: 1971 - 43,262 (Kobayashi 1973); 1979-80 - 35,000 (Kobayashi 1991); 1982 - 47,640 (Loope and Crivellone 1986); 1991 - 64,800 (Kobayashi 1993).

Argyroxiphium sandwicense ssp. *macrocephalum* has a somewhat vulnerable combination of traits. The monocarpic (flowers once and then dies) silversword is extremely slow-growing, requiring 15-50 years to mature from seed to reproductive age (Loope and Medeiros, in press). The plant remains a compact rosette until it sends up an erect. central flowering stalk, sets seed, and dies. The silversword flowers from June to September, with annual numbers of flowering plants varying dramatically from year to year. Furthermore, it has been demonstrated that *Argyroxiphium sandwicense* ssp. *macrocephalum* is not able to self-fertilize (Carr *et al.* 1986). As a result it is reliant upon the availability of pollinating insects, primarily localized endemic species (bees, moths, flies, bugs, and wasps) for reproduction.

The major reasons for the decline of this species in the early part of the century were direct removal of plants by humans and browsing by cattle and goats (feral and domestic ungulates). Although this taxon has gained attention as a conservation success story, the silversword is presently facing new threats that may prove much more difficult to manage. These threats are a loss of pollinators and possible competition from introduced plants.

The greatest threat to silversword pollinators appears to be the Argentine ant (*Iridomyrmex humilis*). This introduced species occupies two disjunct areas between 2100 and 2900 meters (6800 and 9400 feet) elevation, totaling about 160 hectares in Haleakala National Park. This predaceous ant negatively affects the endemic arthropod fauna (Cole *et al.* 1992), including pollinators, which evolved in the absence of ant predation. A marked expansion in the ant's range was noted in 1993, especially at the higher elevation area (Medeiros *et al.* 1994). Unless this species is controlled, it is likely that the Argentine ant will continue to slowly spread and eventually come to occupy much of the range of the silversword. Such an infestation has potentially catastrophic effects on pollinator populations on which the silversword is highly dependent (Carr *et. al.* 1986). The result of a reduction in native pollinators of the silversword is reduced reproductive capacity and lessened chance for long-term survival. Alien yellowjackets (*Vespula pennsylvanica*) pose a lesser, though significant, threat toward elimination of silversword pollinators.

Additional possible future threats include competition from alien plant species, namely mullein (*Verbascum thapsus*) and fountain grass (*Pennisetum setaceum*) (Loope *et. al.* 1992). The extremely limited natural range of the silversword makes it particularly vulnerable to extinction due to a single catastrophic event such as a natural disaster or alien plant or animal introduction.

- *Gouania hillebrandii* (no common name)

Gouania hillebrandii (Rhamnaceae) was federally listed as endangered on November 9, 1984, (49 FR 44753) and included in a recovery plan in 1990 (USFWS 1990). This listing included the designation of four areas of dry forest in the District of Lahaina, County and island of Maui, Hawaii, as critical habitat for the species. *Gouania hillebrandii* is an erect to sprawling shrub that formerly occurred in dry forest on Molokai, Lanai, Maui, and Kahoolawe. Today, however, it is known from only two localities on West Maui: the west facing slopes of Paupau and Lihau, both in the District of Lahaina.

The Paupau subpopulation occurs on State lands administered by the Hawaii Department of Education. This subpopulation is located above Lahaina on the west facing slopes that form the south wall of Kahana Stream between 340 and 490 meters (1,100 and 1,600 feet). The subpopulation occupies roughly 15 acres within a designated critical habitat of about 50 acres. The area has historically been heavily browsed and currently hosts both native and introduced plants.

The size of the Paupau subpopulation has been estimated or counted on five occasions from 1955 to 1980. When St. John first visited the site in December 1955, *Gouania hillebrandii* appeared to comprise 25 percent of the shrub cover. On later visits in December 1965 and February 1966, St. John found the subpopulation much diminished and reduced in vigor (Holt 1981). In 1966, Cooley tallied 517 plants for three ridges. On November 10, 1980, Holt censused the same three ridges and arrived at a subpopulation estimate of between 750 to 1,000 plants (Holt 1981).

The Lihau subpopulation occurs on State lands managed by the Hawaii Department of Land and Natural Resources. This subpopulation is found in 3 areas totaling roughly 10 acres. The range is within a designated critical habitat of about 60 acres on the west facing foothills at Lihau between 240 and 520 meters (800 feet and 1,700 feet) in elevation. In contrast to disturbed conditions at Paupau, the plant community at Lihau has retained much of its integrity, being composed largely of native shrubs and grasses. Ungulates are absent from the area, undoubtedly a reason why the native vegetation remains intact.

In 1980 the Lihau subpopulation was estimated to consist of approximately 950 to 1,100 plants (Holt 1981). Neither population has been systematically quantified in recent years, but the Lihau population is estimated at approximately 5000 individuals (R. Hobdy, personal communication 1997).

The main threats that have contributed to the decline of *Gouania hillebrandii* are browsing and trampling from feral and domestic ungulates and insect damage. Currently, insects are still considered a threat as is possible competition from alien plants. The alien Hibiscus snow scale (*Pinnaspis strachni*) has been present at Paupau since at least 1943, and is now present at Lihau. Many individuals of *Gouania hillebrandii* at Paupau have been killed by this insect. In October 1980, Holt (1981) found that at Paupau, the alien Hibiscus snow scale was affecting nearly all *Gouania hillebrandii* other than small seedlings. Only a few plants at Lihau were affected. Additionally, herbarium specimens as early as 1955 show evidence of widespread damage to leaf margins by unidentified chewing insects. The signs of leaf-chewing insects are still present in both subpopulations but are more common at Paupau (Holt 1981).

Gouania hillebrandii may also face competition from alien plants, particularly at Paupau, where silk oak (*Grevillea robusta*) forms an open woodland along ridge flanks and occurs more sparingly as shrubs or low trees on ridge crests. Although *Gouania hillebrandii* will grow in open stands of *Grevillea*, it is more abundant in full sun and exposed conditions.

b) *Sea turtles*: This group includes the following five species: loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriaceae*), hawksbill sea turtle (*Eretmochelys imbricata*), and olive ridley sea turtle (*Lepidochelys olivacea*). Unlike green and hawksbill sea turtles that nest in the Hawaiian Islands, loggerhead, leatherback, and olive ridley sea turtles occur in Hawaii only incidentally (NMFS 1992).

The hawksbill was selected to represent the sea turtle group because they nest on the island of Maui, as well as on the islands of Hawaii and Molokai, with the largest number of nesting sea turtles occurring at Kamehame Beach on the Big Island. The State-wide hawksbill population is thought to contain less than 30 nesting females.

Hawksbill sea turtles nest in very low numbers, usually on remote beaches (NMFS & USFWS 1996). Little is known about the marine habitat of the hawksbill. Marine sponges are believed to be the primary food source of this species (NMFS & USFWS 1996).

The causes of decline for this species include intentional harvest (which was legal in the past), nest predation, human disturbance on nesting beaches, and destruction of habitat (NMFS & USFWS 1996).

c) *Waterbirds:* This group includes the following four endangered taxa: Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*), Hawaiian duck or koloa (*Anas wyvilliana*), Hawaiian coot or 'alae ke'o ke'o (*Fulica alai*), and Hawaiian moorhen or 'alae 'ula (*Gallinula chloropus sandvicensis*). These species are found in a variety of wetland habitats including freshwater marshes, coastal ponds, taro patches, irrigation ditches, and in the case of the koloa, montane streams and swamplands. Accurate population estimates are not available; however, none of these species is thought to number more than 2,500 individuals.

The Hawaiian stilt was selected to represent the waterbird group. Stilts are now found on all of the main Hawaiian Islands except Kahoolawe.

Stilts prefer to nest on freshly exposed mudflats, interspersed with low growing vegetation. The nest itself is a simple scrape on the ground. These characteristics leave nesting stilts and their offspring vulnerable to introduced vertebrate predators. Stilts require early successional marshlands with water depth less than 15 centimeters (6 inches), perennial vegetation that is limited and low growing (*Paspalum* sp. and *Batis maritima*), or exposed tidal flats.

The primary cause of the decline of the four species of endangered Hawaiian waterbirds has been the loss of wetland habitat. In addition, hunting in the late 1800's and early 1900's took a heavy toll on koloa populations and, to a lesser extent, populations of the other three endemic waterbirds (Swedberg 1967). Other factors which contributed to historic waterbird population declines and continue to be detrimental include predation by introduced animals, altered hydrology, invasion of habitat by alien plants, hybridization, disease, and environmental contaminants. Like all native waterbirds, the stilt would be vulnerable to new alien vertebrate predators (*e.g.* snakes) and

invertebrate predators (such as ants, which can swarm newly-hatched birds), new avian diseases and/or disease vectors, predators of aquatic invertebrates on which they feed, and aggressive aquatic or shoreline weeds.

d) *Forest birds*: The Hawaiian honeycreepers belong to the Subfamily Drepanidinae (Family Fringillidae) which is endemic to Hawaii (Pratt *et al.* 1987). Twelve species of forest birds were found historically on Maui (USFWS 1984). Of these 12, the 'o'u (*Psittirostra psittacea*) became extinct in this century, and five others are listed as endangered: Maui parrotbill (*Pseudonestor xanthophrys*), Maui nukupu'u (*Hemignathus lucidus affinus*), Maui akepa (*Loxops coccineus ochraceus*), crested honeycreeper (*Palmeria dolei*), and po'ouli (*Melamprosops phaeosoma*) (USFWS 1983a, USFWS 1984). The crested honeycreeper was chosen as the representative of the Maui forest bird species because it is somewhat more common than the other listed species and because, although primarily a nectar-feeder, it also feeds on invertebrates, making it susceptible to a broader suite of introduced alien species (*i.e.*, it would be threatened by the introduction of both plant and invertebrate predators or competitors).

The endangered crested honeycreeper (*Palmeria dolei*), or akohekohe, is the largest extant honeycreeper on Maui (USFWS 1984). Observations indicate that akohekohe are nectar-feeders, primarily feeding on ohi'a flowers (*Metrisideros polymorpha*), but also gleaning invertebrate food items (VanGelder 1996). The other important species akohekohe forage on are kolea (*Myrsine* sp.), alani (*Melicope* sp.), and akala (*Rubus hawaiiensis*), and the greatest use of non-flower substrates and species other than ohi'a occurred during months of peak nesting activity (VanGelder 1996). VanGelder (1996) postulates that the use of nonnectar foods during nesting reflects the need for protein for egg production and chick growth (Ricklefs 1974). Nesting was observed from late January extending through June with peaks in March or May (VanGelder 1996). Nests are built in ohi'a trees in wet ohi'a forests between 1655 and 1836 meters (5400 and 6000 feet) elevation (VanGelder 1996). Nesting and fledging success may be correlated with abundance of ohi'a flowering (VanGelder 1996).

Historically, akohekohe occurred on Maui and Molokai and were observed to be "locally abundant" on both islands at the turn of the century (Perkins 1903). They were last observed on Molokai in 1907 and were considered extinct there by 1944 (Bryan 1908b, Richardson 1949). Though extinct from Molokai, the akohekohe is still considered locally common in the upper rainforests of East Maui (Pratt *et al.* 1987). However, surveys in 1984 found a 30% reduction in the number of survey stations in which the akohekohe was detected suggesting a decrease in the population (Seal *et al.* 1992). The current population is estimated to number 4000 individuals (Berlin and VanGelder in prep.). Avian malaria is widespread in the main Hawaiian Islands below 1500 meters (5000 feet), the approximate upper elevational level of the malaria vector, the night-biting mosquito (*Culex quinquefasciatus*) (Scott *et al.* 1986). Mosquitos are also vectors of avian pox (USFWS 1984). The devastating effects of introduced diseases to the native Hawaiian passerines is well documented (van Riper *et al.* 1982, Warner 1968). Van Riper *et al.* (1982) suggest that the Molokai akohekohe became extinct due to avian malaria.

Fossil evidence shows that akohekohe also once occurred in high elevation dry forests of leeward east Maui (James and Olson 1991, VanGelder 1996), and VanGelder suggest that the current distribution of akohekohe in wet forests may not represent optimal habitat. The historical range included wet forests on west Maui and Molokai and the current range (in Haleakala) is believed to have constricted over the last 10-15 years (Seal *et al.* 1992).

All of the Hawaiian forest birds face similar threats. The decimation of Hawaiian avifauna has been attributed to human-related causes, including: habitat destruction (due to the effects of humans and alien species), competition with and predation by introduced species, harvesting, and disease (Atkinson *et al.* 1993, Banko and Banko 1976, Scott *et al.* 1986). The extinction and/or endangered status of over 70 avian species is the result of interactions between all of these factors and it is impossible to isolate any single factor or threat (Scott *et al.* 1986). Threats that currently impact the akohekohe population are pig and goat (*Capra hircus*) damage to the native forests, interspecific competition with exotics such as the red-billed leothrix (*Leiothrix lutea*), predation by exotic species such as rats, habitat loss due to exotic plants, and diseases (Ellis *et al.* 1993, Seal *et al.* 1992, USFWS 1984, VanGelder 1996). There is a constant possibility that a more temperate-adapted bird-biting mosquito, capable of surviving at higher elevations, will be accidentally introduced to Hawaii, leading to the extinction of the species remaining in upper elevation forest refugia (USFWS 1984). Although the akohekohe population is considered more secure now than previously thought (Scott *et al.* 1986), the single, small population and the heavy reliance of the species on ohi'a makes it extremely vulnerable to stochastic events (VanGelder 1996).

e) *Nene*: The waterfowl family (Anatidae) includes ducks, geese, and swans. Geese are generally less restricted to or dependent on water than other members of this group, being primarily grazers on land, and exhibit several adaptations to a more terrestrial existence. The Hawaiian goose (*Branta sandvicensis*) exhibits these characteristics and is unique among the extant, endemic waterfowl that occur in the Hawaiian Islands.

The nene is medium-sized, with an overall length of approximately 64 centimeters (25 inches). Plumages of both sexes are similar. Nene belong to subfamily Anserinae, tribe Anserini, with other true geese. Genetic information indicates that nene and Canada geese (*B. canadensis*) diverged from a common North American ancestor less than three million years ago (Quinn *et al.* 1991). Nene are endemic to the Hawaiian Islands and are the only one of six endemic goose species to survive into historic times. Nene are grazers, eating over 30 species of native and introduced plants (Baldwin 1947, Black *et al.* 1994). The majority of nene food items are leaves and seeds of grasses and sedges, leaves and flowers of various herbaceous composites, or various fruits of several species of mostly subalpine-alpine shrubs (Black *et al.* 1994). Nene readily feed in both highly altered non-native ecosystems, and remaining remnant native ecosystems on native as well as introduced species, including ohelo (*Vaccinium reticulatum*), kikuyu grass (*Pennisetum clandestinum*), pukiawe (*Styphelia tameiameia*), and molassess grass (*Melinis minutiflora*).

Some early accounts suggested that nene nested primarily in the highlands (Peale 1848, Dole 1869, 1879). However, more recent information indicates the majority of the population formerly bred and

molted in the lowlands [below 400-700 meters (1300-2300 feet)], exploiting the flush of plant foods which occurred during the usually wetter winter months, and retreating to higher elevations [above 1220-1520 meters (4000-5000 feet)] during summer, between June and September, when drier conditions generally prevailed (Henshaw 1902, Perkins 1903, Munro 1944, Baldwin 1945, 1947). Nesting most typically occurs between October and March, with the greatest numbers of first clutches produced between October and December (Kear and Berger 1980). Nene are ground-nesters, using various habitat types and elevations and often nest in areas associated with release sites (Banko 1988). Adults are flightless for a period of four to six weeks, generally attaining their flight feathers about the same time as their offspring, and are extremely vulnerable to predators such as dogs, cats and mongooses at this time (USFWS 1983b).

Since the time of European contact, nene were only known with certainty from the island of Hawaii (Kear and Berger 1980). Fossil evidence, however, suggests that nene once occurred on many of the main Hawaiian Islands (Olson and James 1991). Baldwin (1945) estimated the nene population for Hawaii prior to the arrival of westerners at approximately 25,000 birds. If there was a Maui population of nene at the time of western contact, it was probably extirpated before 1890 (Henshaw 1902). Baldwin (1945) and Fisher *et al.* (1969) noted that the decline in the nene population began after 1800 as birds became extirpated in the lowland habitats. The decline was greatly accelerated during the period from 1850 to 1900. Between 1900 and 1944, their range and numbers were further reduced to the upland habitats in more remote areas. Smith (1952) estimated that the population in 1952 was about 30 birds. Current distribution has been highly influenced by the location of release sites for captive-bred birds and nene currently inhabit elevations from sea level to 2300 meters (7500 feet) (USFWS 1983b). Habitat and vegetation community types used range from coastal dune vegetation and non-native grasslands (*e.g.*, golf courses, pastures, and rural areas) to sparsely vegetated high elevation lava flows, deserts, native alpine grasslands and shrublands, as well as open native and non-native alpine shrubland-woodland community interfaces. Critical habitat has not been designated for this species.

Since 1949, the State of Hawaii, with the support of the U.S. Fish and Wildlife Service, has operated a propagation program in order to release captively reared nene into the wild. Birds are raised in captivity and the young are introduced into the wild utilizing a gentle release method. Although captive-bred nene have been released since 1960, self-sustaining wild populations have not been achieved and in fact the wild population is dependent on captive releases to maintain its numbers (Devick 1981, Morin and Walker 1986, Banko 1988, Black *et al.* 1991). Reintroduced populations of nene currently exist on the islands of Kauai, Maui and Hawaii, with estimated populations of 220, 275 and 220, respectively (Carol Terry, Hawaii Division of Forestry and Wildlife, personal communication 1997). Nene were first released on Maui at Haleakala Crater in 1962. The last major release of captive-bred nene at this location (48 birds) was made in 1977. The Haleakala nene population appears relatively static. Nene on the island of Hawaii are currently found in a number of areas between sea level and 2400 meters (7900 feet), with population centers at various locations, including Kahuku, Kulani, Pu'u O'o Ranch, Hawaii Volcanoes National Park, Kapapala, Shipman and Kings Landing, and Pu'u Wa'awa'a. On Kauai, the two major nene population centers are in the southeast and northeast parts of the island.

The primary causes of the decline in the nene population on Hawaii in the lowland habitats after 1800 (Baldwin 1945, Fisher *et al.* 1969) include hunting of nene, which occurred during nene breeding season, and exotic mammal impacts. Dogs, cats, mongooses, pigs, and rats prey on nesting and flightless nene as well as goslings. Humans and feral ungulates can adversely alter nene habitat (Carol Terry, Hawaii Division of Forestry and Wildlife, personal communication 1997). The loss of available lowland habitat has had an unknown but probably large negative effect on nene populations.

The current major limiting factors, as presently understood, are predation by introduced mammals; nutritional deficiency; poor breeding success; human-caused disturbance; genetic homogeneity; behavioral problems; and, disease. Black and Banko (1994) report that nesting success was nearly twice as high for nene protected from predators and provided supplemental food as it was for nene in the wild. The same report stated that mongooses were the most serious predator of nene in all habitats studied. Problems with nene breeding success may be related to social dynamics resulting from small population size or nene release strategies. Parent or foster parent-reared goslings may be less susceptible to mortality and more socially adept than group-reared goslings (Marshall and Black 1992). Recent studies (Black *et al.* 1994) indicate that inadequate nutrition, particularly at higher elevations sites, is a limiting factor on nene reproduction and gosling survival. Black (1992) hypothesized that this inadequate nutrition may be the result of a change in available food plants caused by the spread of introduced plant species. Black *et al.* (1993) found that nene that emigrated from drought-stricken habitats to better ones were able to survive and they speculated that emigration behavior was learned from wild nene and that emigration during times of drought, and the knowledge of migration routes, may have been lost when nene populations were very low.

Genetic homogeneity may be limiting reproductive success and survival. Rave (1994) has demonstrated inbreeding depression effects on nene hatchabilities and gosling survival. There are a variety of human activities that impact nene, including disturbance by hikers, hunters and other outdoor recreators as well as direct harm caused by vehicles and golf balls. The role of diseases (*e.g.*, pox, malaria, parasites) in nene recovery is still poorly documented and understood but has long concerned managers and researchers (Bailey and Black 1995, Gassmann-Duvall 1987, Kear and Berger 1980, Kear and Brown 1976). The risk of introducing additional diseases, parasites, or invertebrate predators (such as ants, which can swarm newly-hatched birds) that nene would be vulnerable to is a serious concern.

f) ***Hawaiian hoary bat:*** The Hawaiian hoary bat (Vespertillionidae: *Lasiurus cinereus semotus*, Allen, 1890) is the only extant, native, terrestrial mammal known from the Hawaiian archipelago. Hawaiian hoary bats are a medium-sized (14 to 22 grams), nocturnal, insectivorous, microchiropteran bat (USFWS 1997b). The genus *Lasiurus* includes thirteen extant species and the Hawaiian hoary bat is one of three recognized subspecies of *Lasiurus cinereus* (Hall 1981). The Hawaiian hoary bat is endemic to the Hawaiian Islands and is believed to be derived from the North American hoary bat.

The Hawaiian hoary bat is a solitary bat that roosts among foliage in trees and shows a high degree of site fidelity (Jacobs 1993). Although the North American hoary bat forages almost exclusively in open habitats away from vegetation (Barclay 1985), Hawaiian hoary bats have been observed foraging in a variety of both open and vegetatively cluttered habitats, including open fields near native or alien vegetation, over the ocean (in bays near shore), over lava flows, and at streams and ponds (Baldwin 1950, Jacobs 1993, 1994, Kujioka and Gon 1988, Kepler and Scott 1990, Reynolds *et al.* 1997). Roosting has been documented in numerous tree species, including hala (*Pandanus tectorius*), kukui (*Aleurites moluccana*), pukiawe (*Styphelia tameiameiae*), and Java plum (*Egueni cumni*) (Baldwin 1950, Bryan 1955, Kramer 1971). The effect on the bat from the significant deforestation that has occurred on the Hawaiian Islands is unknown (Tomich 1986c) and whether native vegetation is required by or important to Hawaiian hoary bats is not known. Critical habitat has not been designated for this species (USFWS *in litt.*). Breeding has been documented on Hawaii and Kauai, but is not known from the other islands (Kepler and Scott 1990).

Relatively little research has been conducted on the Hawaiian hoary bat and data regarding its habitat affinities and population status are often conflicting. Bats have been documented on the islands of Hawaii, Maui, Oahu, Kauai, and Molokai (USFWS *in litt.*). Most observations of bats have been made between sea level and 1,000 meters (3,280 feet) elevation, although they have been seen at elevations as high as 4,115 meters (13,500 feet) (Kepler and Scott 1990, Kramer 1971, Kujioka and Gon 1988, Tomich 1974). Although bats are known from the main Hawaiian Islands, they may be resident on only Hawaii, Kauai, and Maui; the largest populations are thought to occur on Kauai and Hawaii (Kepler and Scott 1990, Tomich 1974, USFWS *in litt.*). There are no verified records for Lanai and Kahoolawe (Tomich 1986a). Population numbers are not known, but the population is believed to have declined over the past one hundred years (USFWS *in litt.*). Population estimates for all islands have ranged from hundreds (Altonn 1960) to a few thousand (Tomich 1969), but these estimates are not based on systematic surveys, and although they may represent informed impressions, they are based on limited and incomplete data (USFWS *in litt.*). No studies have been conducted that directly address population size of the hoary bat, and methods for estimating population numbers of a patchily distributed animal like the Hawaiian hoary bat are virtually non-existent (Findley 1993). Ultimately, few historic or current distribution records exist, limiting the ability to accurately infer the historic or present distribution of this subspecies (Tomich 1986b).

Since no accurate population estimates exist for this subspecies, and because historical information regarding its past distribution is scant, the decline of the bat has been largely inferred (USFWS *in litt.*). Tomich (1986a), for example, suggests that if bat numbers have decreased significantly on Oahu, it may be due to deforestation that occurred in the early ninetoenth century, but he also states that there is little information available beyond the currently known distribution of the bat on the Hawaiian Islands. Observations together with specimen records do suggest that bats are now absent from historically occupied range, but estimates of abundance in formerly occupied areas are lacking and the magnitude of any population decline is not known (USFWS *in litt.*).

Kepler and Scott (1990) suggest bats found on Oahu, Maui, and Molokai may be migrant or vagrant individuals. However, more recent data suggest that bats are resident on Maui (Duvall and

Gassmann-Duvall 1991), where they appear to be restricted to the central, interior portion of the island. Although bats are frequently observed on Maui, their distribution is apparently more restricted than on Hawaii or Kauai (USFWS *in litt.*). However, inferences regarding the current distribution of the Hawaiian hoary bat should be drawn with caution. In some cases, limited distribution may be at least partially an artifact of limited and localized search efforts by researchers (USFWS *in litt.*).

Bat populations can be threatened by habitat loss, pesticides, predation (*e.g.*, snakes, arboreal ants), and roost disturbance (BCI 1991). In general, availability of roosting sites, rather than food availability, predation, or other factors, is believed to be the primary limitation in the distribution and abundance of bats (Fenton 1970, Fenton and Barclay 1980, Humphrey 1975). The decline of the Hawaiian hoary bat may be due primarily to the reduction of tree cover in historic times (Tomich 1986b, Nowak 1994). Additionally, pesticide use may have had an indirect impact via reducing or otherwise altering prey populations. Direct effects from contamination could also be a factor: at least two federally endangered insectivorous bat species have suffered mortality due to pesticide ingestion (Clark *et al.* 1978). The introduction of alien insects could also have altered prey availability. Predation is not believed to be a significant threat to the mainland populations (Shump and Shump 1982) but could be a more significant factor for the Hawaiian subspecies. Ultimately, however, there is no available data that bears directly on the question of a population decline, and Kepler and Scott (1990) clearly pointed this out when they stated that "*Whether the hoary bat has declined because of introduced predators,....agricultural practices, deforestation, or other human induced stresses is completely unknown*" (USFWS *in litt.*).

g) ***Dark-rumped petrel***: The Hawaiian dark-rumped petrel or 'ua'u (*Pterodrama phaeopygia sandwichensis*) is one of two subspecies, both of which are endangered (USFWS 1983c). The Hawaiian dark-rumped is a large petrel that breeds only within the major Hawaiian Islands in barren areas high on mountain slopes (Berger 1972, Pratt *et al.* 1987, USFWS 1983c). It breeds in burrows in nesting colonies and comes and goes at night (Pratt *et al.* 1987). Burrows are utilized year after year, generally by the same pair of petrels (USFWS 1983c). Petrels breed during a short period in April/May/June and lay one egg (Ainley *et al.* ms., Larson 1967). Ua'u currently nest only at elevations above 2200 meters (7,200 feet) in sparsely vegetated areas, which may not be preferred habitat, but which support the last breeding colonies as previously existing colonies at lower elevations have been completely devastated by introduced predators (USFWS 1983c). Little is known about the pelagic distribution of this species (USFWS 1983c). It is rarely seen at sea in Hawaiian waters during the non-breeding season, but is more common to the southeast and between the Line Islands and the Marquesas (Pratt *et al.* 1987, USFWS 1983c).

The ua'u is believed to have had well-established breeding populations on all of the major Hawaiian Islands although there is scant historical information (Berger 1972, Munro 1944). When Bryan collected birds on Molokai in 1907, the species was already apparently much reduced in numbers, it was recognized in the 1930s to be in danger of extinction, and was almost unheard of until 1948 when a live adult was found on Kilauea on Hawaii (Baldwin and Hubbard 1949, Bryan 1908a, Munro 1944, Richardson and Woodside 1954). The largest known breeding population of ua'u is

currently believed to be located on Maui in Haleakala Crater, but they also occur on Mauna Kea and in the Volcanoes area on Hawaii. There are also believed to be small numbers of petrels nesting on Lanai, one of the last low elevation populations remaining (S. Montgomery, *in litt* . 1989, J.L Sincock and T. Telfer *in litt.* 1983). In 1967, Larson estimated 400 breeding pairs to occur in Haleakala while King estimated 355 breeding pairs and a total population of 1,500 birds in the Maui population (King 1971, Larson 1967). In 1994, it was estimated that there are 900 breeding pairs, mostly on Maui (Hodges 1994). However, Ainley *et al.* (ms.) estimate a larger breeding population, around 1,600 pairs, on Kauai than was previously believed to exist (100 pairs), and postulate that the Kauai population may be larger than the Maui population. The entire population of Hawaiian dark-rumped petrels, based on at-sea censuses, is estimated at 19,000 birds, including sub-adults and adults (Spear *et al.* 1995).

Predation is the single greatest limiting factor to the survival of the ua'u (USFWS 1983c). Mongooses *(Herpestes auropunctatus)* are credited with the demise of the ua'u on Hawaii, Maui and Molokai, pigs (*Sus scrofa*) and cats (*Felis catus*) on Lanai, and the ancient Hawaiians may have exterminated it on Oahu (Munro 1944). The black rat (*Rattus rattus*) is believed to be the primary predator at Haleakala, Maui (Larson 1967); Polynesian rats (*Rattus exulans*) occur at Haleakala as well (King 1971) and may also prey upon ua'u eggs and young. Goats are known to trample burrows of the ua'u on Hanakauhi Peak, Maui (Kepler, unpublished report). Other ground predators introduced to the islands, such as snakes or ants, could impact the ua'u further. Another threat is attraction to artificial lights, particularly by fledglings. Confusion and temporary night-blindness may result, causing the petrels to fly into obstructions and fall to the ground where they are susceptible to predation by dogs, cats, and mongooses, or to being hit by cars (USFWS 1983c). The role of disease in the decline of the petrel is unknown but disease is likely to have had a negative impact and the introduction of additional diseases could be devastating (USFWS 1983c). Habitat destruction is also believed to be a limiting factor. Historical accounts of nesting areas for the ua'u indicate they once nested in vegetated lower elevations prior to development and increased fires. Developments in the upper elevation sites, where the ua'u are currently restricted, may directly interfere with nesting habitat, cause light attraction problems, and increased fire threats (USFWS 1983c).

h) *Blackburn's sphinx moth*: Insects are of great ecological significance in terrestrial habitats; for example, two thirds of all flowering plants are dependent on insects for pollination (Barnes 1980). Insects exhibit a great diversity of ecological roles, but one commonality includes tight links to vegetation, such that if the plant goes extinct, the insect is likely to go extinct. The diversity of Hawaiian habitats and plant communities support one of the most unique arthropod faunas in the world, with an estimated 10,000 endemic species (Howarth 1990). Unusual characters of Hawaii's arthropod fauna include the presence of relictual groups, the absence of social insects such as ants and termites, generic endemism, extremely small geographic ranges, large species radiations, novel ecological shifts, flightlessness, and loss of certain antipredator behaviors (Howarth 1990, Simon *et al.* 1984, Zimmerman 1948, 1970). Hawaiian insects are highly susceptible to predation by and competition with novel predators like ants, wasps and parasitic species, and other alien insects. The

representative chosen for this group is the only Hawaiian insect currently proposed for listing although there are a suite of insects that are candidates for listing or species of concern.

Blackburn's sphinx moth (*Manduca blackburni*) is Hawaii's largest native insect, with a wingspan of up to 5 inches. The larvae feed on plants in the nightshade family (Solanaceae). The natural host plants are native shrubs in the genus *Solanum* (popolo), and endemic trees in the genus *Nothocestrum* ('aiea) (Riotte 1986), on which the larvae consume leaves, stems, flowers and buds (Betsy Gagne, Hawaii Department of Land and Natural Resources, personal communication 1994). Larvae have been observed feeding on *Nothocestrum latifolium* and tree tobacco (Howarth, Bishop Museum, *in litt.*, 1994), but the relative number of larvae and adults produced on these hosts is unknown. Many of the host plants recorded for this species are not native to the Hawaiian Islands, and include *Nicotiana tabacum* (commercial tobacco), *Nicotiana glauca* (tree tobacco), *Solanum melongena* (eggplant), *Lycopersicon esculentum* (tomato), and possibly *Datura stramonium* (Jimson weed) (Riotte 1986). Although Blackburn's sphinx moth will colonize and utilize alien plants, the only persistent population is associated with species of *Nothocestrum*, and it is believed that this species may be a requirement for the moth's existence (Asquith 1997). The Service is funding a research project on Blackburn's sphinx moth that is likely to continue for several years, with the goal of determining the current status of the moth, identifying possible predators and parasites, and establishing new populations of the moth in the wild. The information being sought for this purpose includes techniques of captive propagation, determination of possible predators, selection of appropriate release sites, and surveys to better define the current distribution of the moth.

Blackburn's sphinx moth has been recorded from all of the main Hawaiian islands and collected from sea level to 760 meters (2,500 feet) elevation. Most historical records were from coastal or dryland forest habitats in areas receiving less than 120 centimeters (50 inches) annual rainfall. On the island of Kauai, this moth was recorded only from the coastal area of Nawiliwili. Populations were known from Honolulu, Honouliuli, and Makua on leeward Oahu, and Kamalo, Mapulehu, and Keopu on Molokai. It appears that this moth was historically most common on Maui, where it was recorded from Kahului, Spreckelsville, Makena, Wailuku, Kula, Lahaina, and "West Maui." On Hawaii, it was known from Hilo, Pahala, Kalaoa, Kona, and Hamakua.

Few specimens of this species have been seen since 1940, and after a concerted effort by B.P. Bishop Museum staff to relocate this species in the late 1970's, it was considered to be extinct (Gagne and Howarth 1985, 49 FR 21664). In 1984, a single population was discovered at Kanaio on East Maui. The population is located on State-owned land, part of which lies within a natural area reserve, and part of which is used by the Hawaii National Guard for military training. Between 1986 and 1991, a total of six specimens were taken in light traps at Kokomo, Maui, 16 km (10 mi) from Kanaio, which may indicate the presence of an additional population (P. Conant, Hawaii Department of Agriculture, personal communication 1994), although adult moths are strong fliers and these specimens could have originated at the Kanaio population. Two larvae and signs of two other larvae were observed in January 1997 at Spreckelsville, however, no signs of eggs or larvae were found during searches on 30 September 1996 (Conant and VanGelder 1997). It is believed that the

Spreckelsville and the Kokomo populations are ephemeral and probably depend on immigration from Kanaio to persist.

Although Blackburn's sphinx moth was historically found on Kauai, Oahu, Molokai, Maui, and Hawaii, it is currently known only from one population on Maui. This moth has been affected or is currently threatened by one or more of the following: habitat degradation; introduced animals; and biological pest control. The major threats to this species are predation by alien parasitoids and ants, and habitat degradation through the loss of its natural host plant. Alien predatory and parasitic insects are the primary cause of the reduction in range and abundance of Blackburn's sphinx moth, and are the most serious present threat to its continued existence (Asquith 1997). All 4 host plant species of *Nothocestrum* occur in dry to mesic forests, habitat in which the moth has been most frequently recorded. This dry forest habitat has been severely degraded due to past and present land management practices including ranching, deliberate introduction of alien plants and animals, and agricultural development (Cuddihy and Stone 1990). The species is also susceptible to over-collecting by private and commercial collectors.

Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or their habitats and ecosystems in the proposed action area of Maui. The baseline includes Federal, State, local and private actions already affecting the species. For those species whose range extends beyond Maui, only the status of the populations on Maui are reviewed.

a) *Plants*: The entire population of the Haleakala silversword occurs on the island of Maui. As a result of management within Haleakala National Park, human vandalism and feral ungulate browsing have been virtually eliminated. Almost all sub-populations of *Argyroxiphium sandwicense* ssp. *macrocephalum* are located within Haleakala National Park and are currently fenced, protected from ungulates, and annually censused (R. Nagata, personal communication 1997). This species has been successfully propagated at the National Tropical Botanical Garden (D. Ragone, personal communication 1994). The National Park Service considers the Argentine ant a serious threat and is currently researching control mechanisms. Chemical control using a hydromethylnon/protein bait appears to be the best option for controlling or eliminating high elevation populations which are currently restricted in area. This research is now ongoing in cooperation with scientists of the Clorox Technical Center (Loope and Medeiros 1994a; R. Nagata, personal communication 1997). When activity increases, alien yellowjackets *(Vespula pennsylvanica)* are controlled by baiting with encapsulated diazinon (R. Nagata, personal communication 1997).

Although the historical range of *Gouania hillebrandii* includes four islands, it is currently extant and has designated critical habitat only on the island of Maui. The State of Hawaii unofficially listed *Gouania hillebrandii* as an endangered species in 1979. Official State listing followed the Federal listing in 1984, pursuant to Chapter 195D of the Hawaii Revised Statutes. However, the State had already taken the lead in recovery actions for *Gouania hillebrandii* by preparing a protection and

management plan for the Paupau subpopulation (Hobdy 1980) and by establishing a Natural Area Reserve (approved by the Board of Land and Natural Resources and by the Governor) at Lihau. The plants at the Paupau subpopulation are currently within a fenced area that is protected from ungulates and control of silk oak (*Grevillea robusta*) is being considered for the future (R. Hobdy, personal communication 1997). Some of the Lihau subpopulation is presently included in and managed as Conservation District forest land under the jurisdiction of the State Division of Forestry and Wildlife. The Natural Area Reserve includes some of the critical habitat at the Lihau site but does not include the Pu'u Hipa area. However, the Natural Area Reserve does encompass suitable areas immediately outside the designated Lihau critical habitat site which might harbor additional *Gouania hillebrandii* or provide habitat for subpopulation expansion in the future. Designation as a Natural Area Reserve protects Lihau from development and land usage that might detrimentally affect the native plant and animal communities lying within the Natural Area Reserve boundaries. Transplanted seedlings have been grown at the Baseyard Nursery of the Maui Division of Forestry and Wildlife.

b) *Sea Turtles*: On Maui, hawksbill sea turtles nest in very low numbers at Kealia Beach, between the towns of Kihei and Maalaea. There were three successful nests at this location in 1996 (Hawaii Wildlife Fund 1996). This population is currently threatened by habitat degradation due to off-road vehicle use on the nesting beach, and the close proximity of a highway. Two gravid females were struck and killed by vehicles during the last three years when they wandered onto the highway. To an unknown degree, this population is likely threatened by egg and hatchling predators as well. This threat has been documented at Kamehame Beach on the island of Hawaii (L. Katahira, NPS, personal communication 1997). The same mammalian predators present at Kamehame (cats, rats, mongooses, and dogs) are present at Kealia.

Nesting sea turtles on Maui would be vulnerable to new alien species preying on eggs or hatchlings, and may harass nesting females, causing them to abandon nesting areas. Ants and invasive coastal plants could lead to further degradation of nesting habitat by altering the existing vegetation in a way that accelerates dune erosion.

Past conservation efforts on Maui have included protection of nests from off-road vehicles at Kealia Beach on Maui, and research to locate foraging grounds. Recently a dune restoration fence was erected at Kealia in order to rebuild coastal dunes and to restrict the movement of sea turtles onto the highway and vehicles onto the beach. Revegetation of this area with native plant species is underway (Kathy Smith, USFWS, personal communication 1997).

c) *Waterbirds*: Stilt numbers on Maui have ranged between 200 and 500 birds between 1983 and 1993. Major stilt populations are at Kanaha and Kealia Ponds. Past conservation efforts have included a long-term hunting ban, protection of habitat through establishment and management of refuges and sanctuaries, population monitoring, mammalian predator control, and numerous research projects. Established in 1993, Kealia Pond National Wildlife Refuge is an extremely important 200 hectare (500 acre) wetland and pond located near Kihei. Kanaha Pond Wildlife Sanctuary, in Kahului, a 95 hectare (235 acres) wetland is owned by the Hawaii Department of Transportation and

managed by DOFAW. Both of these areas provide valuable nesting, loafing, and feeding habitat for stilts and coots. Monthly counts indicate that birds freely move between these two wetlands (Ueoka 1979).

d) *Forestbirds*: The akohekohe is now restricted to a single population estimated at 4000 individuals (Berlin and VanGelder in prep.), found only in the upper elevation [between 1500 to 2300 meters (4900-7500 feet)] rainforests on the north slope of Haleakala Volcano on east Maui (Scott *et al.* 1986). This distribution is believed to be related to the presence of avian diseases at the lower elevations (Seal *et al.* 1992).

Efforts undertaken on behalf of the akohekohe and the upper elevation rainforests of Maui have been extensive and have involved Federal, State, and private entities. The 3000 hectare (7500 acre) Hanawi Natural Area Reserve, established in 1986 and the 2100 hectare (5230 acre) Waikamoi Preserve established in 1983 provide protection for important forest habitat. Akohekohe habitat in these two areas and parts of Haleakala National Park are actively being managed in order to reduce the adverse effects of feral ungulates. One of the techniques employed is the use of exclosure fences to prevent the influx of feral ungulates. The East Maui Watershed Partnership was formed in 1991 by Federal, State, County and private landowners. This partnership has coordinated native and alien species monitoring programs, along with alien species control activities within the range of the akohekohe. Additional research and monitoring have been conducted by the Biological Resources Division of the U.S. Geological Survey, and the Service. The Peregrine Fund, in partnership with the Division of Forestry and Wildlife and the Service, has initiated the development of captive propagation and release techniques for the akohekohe and other forest bird species.

e) *Nene*: An estimated 250 nene reside on the island of Maui (28% of the total population). Most of these are found inside Haleakala Crater with a few birds on the exterior of the crater. Additionally, some birds can be found on West Maui.

Haleakala National Park controls predators such as cats, mongoose, rats, and feral dogs in areas of Haleakala Crater, and has removed feral ungulates to allow for habitat recovery. DOFAW, the Service and the Peregrine Fund operate the Maui Bird Conservation Center where nene are captively produced for release at various sites State-wide. The National Park Service (NPS) and DOFAW also conduct monitoring efforts.

f) *Hawaiian hoary bat*: The size of the hoary bat population on Maui is unknown but is believed to be restricted to the central, interior portion of the island (USFWS *in litt.*, 1997). The Service is preparing a draft recovery plan for this species (USFWS, *in litt.*, 1997). Recovery actions suggested in the plan include studies on basic natural history as well as on abundance and distribution, identification and control of threats, monitoring programs and public education efforts.

g) *Dark-rumped petrel*: The largest known breeding population of ua'u is currently believed to be located on Maui in Haleakala Crater at elevations above 2200 meters (7,200 feet) (USFWS 1983c). In 1994, it was estimated that there were approximately 900 breeding pairs on Maui (Hodges 1994).

This is approximately 20% of the world population of this species. Haleakala National Park controls predators such as cats, mongoose, rats, and feral dogs in and around breeding areas (Hodges 1994).

h) *Blackburn's sphinx moth*: The current number of individuals of this species is not known (David Hopper, Service, personal communication 1997); however, 100% of the known population occurs on Maui. In 1984, a single population was discovered at Kanaio on East Maui. The population is located on State-owned land, part of which lies within a Natural Area Reserve, and part of which is used by the Hawaii Army National Guard for military training (Asquith 1997). Between 1986 and 1991, a total of six specimens were taken in light traps at Kokomo, Maui, 16 kilometers (10 miles) from Kanaio, which may indicate the presence of an additional population (P. Conant, Hawaii Department of Agriculture, personal communication 1994), although adult moths are strong fliers and these specimens could have originated at the Kanaio population.

The Service is currently funding research on this species, with the goal of establishing new populations of the moth in the wild. The information being sought for this purpose includes basic life history information, techniques of captive propagation, determination of possible predators, selection of appropriate release sites, and surveys to better define the current distribution of the moth.

Part of the single remaining population of this moth is located on State land utilized for military training of the Hawaii Army National Guard. Federally supported activities that could affect Blackburn's sphinx moth and its habitat in the future include, but are not limited to, release or augmentation of biological control agents, road and firebreak construction, troop movements, and fire resulting from the use of live ammunition (Asquith 1997). At this time, there are no major impacts to this species resulting from National Guard activities and the National Guard is working on a management plan for these lands that will include habitat enhancement such as future plantings of *Nothocestrum* host species, possible fencing of areas, and limited spraying of herbicides to control for alien species.

Almost all alien species introductions in Hawaii are the result of human actions, either governmental or private. For example, a total of 2275 alien invertebrates were intercepted by Federal inspectors in 1994. Out of this total, 89% were found in either air cargo or passenger baggage (Noda and Associates 1997). It is estimated that over 4373 alien species have become established in the wild in the Hawaiian Islands. This includes 956 plants, 46 birds, 19 mammals, 23 reptiles, 4 amphibians, 73 fish, and more than 3247 invertebrates (Eldredge and Miller 1997). In addition to the total number of alien species, the rate at which new alien species are entering Hawaii is increasing. The average number of invertebrate introductions per year has gone from 16 during the years between 1937 and 1961, to 20 in the 1970s (TNCH 1992). The current estimated rate of invertebrate introduction to Hawaii is between 20-30 species per year (Noda and Associates 1997).

The present rate of introduction and establishment of alien species on the island of Maui is unknown, but the current rate of invertebrate introductions is estimated to be between 5 and 10 species per year. Several species of vertebrates (tree frogs and a chameleon) have become established in the native forest of Maui within the last decade (Fern Duvall, DOFAW, personal communication 1997).

Many ongoing programs, involving multiple agencies and private partners, are designed to combat the effects of alien species on native Hawaiian organisms. These range from population augmentation and large-scale habitat conservation efforts to increased scrutiny of biological control agents. Several multi-party advisory groups have been formed within the past few years including the Hawaii Forestbird Recovery Team and the Hawaii and Pacific Plants Recovery Coordinating Committee. The latter group is finalizing a comprehensive plant conservation strategy for listed and proposed plants. The Coordinating Group on Alien Pest Species (CGAPS) was formed by State and Federal agencies, along with The Nature Conservancy of Hawaii to address the issue of alien species in Hawaii.

A number of programs are in place to control feral ungulates in natural areas. These programs primarily involve fencing to exclude ungulates, but also include direct control measures. Control of predatory alien species (rats, cats, dogs, and mongooses) is being conducted primarily for the benefit of listed forestbirds and waterbirds. Propagation of plants, forestbirds, and nene for augmentation of existing populations or the reestablishment of extirpated populations is being conducted by a number of organizations.

The above activities are being carried out by the National Park Service, Hawaii Department of Land and Natural Resources, The Nature Conservancy of Hawaii, Biological Resources Division of the U.S. Geological Survey, The Peregrine Fund, East Maui Watershed Partnership, Maui Land and Pineapple Company, the Service, various private landowners, and others.

Effects of the Action on Listed Species

The potential for increased introductions of alien species as a result of the proposed project could adversely affect all listed and proposed species on Maui (Tables 1 and 2), based on the examples given above.

The airport environs (the direct action area) harbors listed waterbirds (Hawaiian stilt, Hawaiian coot, Hawaiian duck) and a small and possibly ephemeral population of the proposed endangered Blackburn's sphinx moth. Because the Spreckelsville population of *M. blackburni* persists in the presence of existing airport operations, and because construction of the project will not take place near this population, the Service has determined that the direct effects of the project would not present the likelihood of jeopardizing the continued existence of this proposed species. The Service has previously determined that the direct effects (i.e., aircraft flights over the pond during construction) of the proposed project are not likely to adversely affect listed species of waterbirds at the Kanaha Pond Wildlife Sanctuary (Service letter dated July 5, 1996).

The primary concern of the Service is the potential indirect effect of this project on listed and proposed species and critical habitat due to the potential introduction of additional alien species to the island of Maui (the indirect action area). The continuing influx of alien species poses a grave threat to all native species in Hawaii, including those on Maui. These species are introduced by

accidental or deliberate transport on aircraft and ships. The proportion of these species that arrive by air is probably large (BA table 1-5), especially for those species purposefully transported by humans. Because of extensive interisland transport, even native species on other Hawaiian Islands could eventually be affected by alien organisms that become established on Maui.

There is little question that a large number of alien organisms which could be transported purposefully or inadvertently by air could, if established on Maui, cause or contribute to the eventual extinction of listed taxa. Examples include weaver ants, high-altitude mosquitoes, biting midges, snakes and predatory lizards (BA pp. 6-1 to 6-10). Alien plants and animals that colonize native ecosystems can affect listed and proposed species and critical habitat through a variety of means documented in the scientific literature. In addition to direct effects such as predation and herbivory (Cole *et al.* 1992, Sohmer 1976), parasitism (van Riper and van Riper 1985), and competition (Smith 1985), non-native species can interfere with pollination (Cole *et al.* 1992), promote disturbance such as fire (Smith 1985), change nutrient regimes (Vitousek *et al.* 1987), or favor the spread of other alien species (Wester and Wood 1977).

The initiation of direct flights from Asia could increase the risk of Asian species being introduced that now have no direct route to Maui, particularly those organisms passively transported within the aircraft that would be released when the fuselage is opened. In addition, the projected increase in direct domestic air traffic from North America could be expected to increase the rate of introductions to Maui of species present on the mainland.

Because of the large uncertainties in a) which alien species or groups are likely to be introduced, b) which of those species could invade native ecosystems, and c) which native ecosystems and listed species could be affected and how severe would be the effect, analysis of the project effects based on these factors would be unproductive. The Service, therefore, has focused on the potential change in the risk of alien species introduction as the primary means of analyzing the indirect effects of the project.

The effectiveness of each project measure designed to minimize alien species introductions is examined below. Table 3 summarizes the Service's estimate of the effectiveness of these measures against broad categories of alien species and their potential introduction pathways. This table is based in part on Table 8-2 and on the analysis in Appendix E, both in the BA. The Service generally agrees with the assessment in Appendix C of the BA regarding which groups of alien species are most likely to be transported by air and the probable introduction routes associated with each group. Although the categories in Table 3 are not exhaustive, they provide an adequate framework for assessing risk.

1) *Pre-entry Traveler Education about Alien Species.* Currently, inconsistent information regarding alien species or their dangers is provided to incoming passengers with the exception of that on the agricultural declaration form. Focus group studies in California (Fleishman-Hillard 1994) have shown that many travelers are unaware of the problem and would change their behavior if properly informed of the risks posed by alien species and the

penalties if caught. An in-flight video could be a very effective tool, and reach a large proportion of passengers, if shown consistently by the major carriers. No agency has the power to force airlines to show these videos. Response by the airlines to the existing video has been poor. If an acceptable video were available and shown, this measure could be moderately to highly effective against alien species transported by passengers (Table 3).

2) *Notification of New Routes to Maui.* Overseas routes not anticipated in the DEIS may be authorized by the Department of State. Beyond the planning horizon of the DEIS (2010), it is reasonable to assume that additional points of origin and overseas/international flights will be added to projected traffic levels. This measure has no direct effect on alien species introductions, although it may give HDOA and USDA time to allocate additional resources to accommodate the change in traffic.

3) *Treatment of Cargo Holds.* Effective pre-treatment of cargo spaces would greatly reduce the risk of biting midges, mosquitoes and other passively carried insects being introduced to Maui. The use of chemical pesticides on aircraft is against the current policy of the U.S. Department of Transportation and may pose a health threat to airline personnel due to chronic exposure. Non-chemical pesticidal measures such as sticky traps or light traps, or the use of modified lighting to reduce attractiveness of cargo holds, are of promising but unproven effectiveness and will take time to develop and test. The voluntary nature of the cargo hold treatment program would likely lead to only partial compliance in the short term. Cooperating airlines using traps would, however, generate valuable information on the species and number of individual insects transported in the cargo hold. Although potentially highly effective against adult dipters and ants, the treatments would need to be both effective and mandatory to realize that potential (Table 3).

4) *Traveler Education Regarding Alien Species Risks, Quarantine Restrictions, and Penalties.* CGAPS has developed a comprehensive plan for port-of-entry traveler education, detailed under Cumulative Effects, below. The support of HDOTA will help ensure its deployment and continuation. This measure should be quite effective against casual or inadvertent smuggling of pets, plant material and associated organisms, or biocontrol agents such as ants (Table 3).

5) *Training of Airline and Airport Personnel in Alien Species Recognition and Response.* Airport employees, baggage handlers, and airline cabin personnel have many opportunities to observe passengers, their luggage, and the airport environs. This training will be planned with the input of the main inspection agencies and CGAPS, and so will probably be quite thorough and effective. Airport personnel can be compelled to attend, but airline cabin personnel cannot. Assuming partial attendance by cabin crews and full training of airport personnel, this measure should be moderately effective against all groups of aliens (Table 3).

6) *Agriculture Arrival Inspection Facilities.* Provision of critical infrastructure will allow the HDOA inspectors, who are responsible for domestic overseas arrivals, and USDA who

is responsible for international arrivals, to process passengers and baggage with more efficiency than is currently possible. By freeing inspectors' time, this measure will also allow more thorough inspection of cargo and aircraft. This measure will, therefore, be moderately effective against all groups of alien species, with the exception of seeds attached to passengers' shoes or clothing (Table 3).

7) *Additional Arrival Inspectors.* Direct inspection and oversight by trained personnel is the most flexible and comprehensive means of preventing the introduction of alien organisms. The projected increase in domestic overseas arrivals will require additional HDOA inspector staff. The Service defers to the judgement of HDOA regarding staffing levels needed to adequately inspect the projected traffic load (letter from [illegible] HDOTA, June 17, 1997). It is anticipated that two detector do[illegible] tors will be stationed at Kahului. This level of staffing sh[illegible] uggled organisms and invertebrates associated with plants [illegible] however, this staffing level may become inadequate if traffic expands [illegible] the projections. USDA will have sufficient inspectors and resources to handle international inspection needs.

8) *New Air Cargo Building.* Air cargo containers must be opened within an effective enclosure in order to contain insects and other vagile organisms. The planned cargo facility will provide such a secure environment for cargo inspection. The infrastructure included in the building design will enhance communication and data sharing among the inspection agencies, will allow on-site testing and sterilization of contaminated articles, and will allow testing of the utility of X-ray examination of cargo. These features will greatly increase the efficiency and coordination of inspection efforts and should be moderate to highly effective against alien species associated with cargo (Table 3).

9) *Quality Control Program.* Efforts to intercept alien species transported by aircraft are hampered by a lack of information on introduction rates, the relative importance of various pathways, and the efficacy of inspection, public education and other interception procedures and technologies. Data to address these points will be gathered and analyzed by a unique new program and the results shared with responsible agencies. In addition to utilizing interception data, the program will design and execute tests of the system so that the proportion of introductions intercepted can be estimated. Recommended changes to airport/inspection operations proposed by the program should improve the efficiency of interception as well as acting to inform policy-makers and the public of the limitations of current airport operations. The yearly reports should also assist in efforts to determine sources of detected pest outbreaks. This program should result in improved operations and should show moderate to high effectiveness against all alien species threats (Table 3).

10) *Security Committee.* If the Kahului Airport Security Committee includes alien species control as a security issue, inspection staff will be able to voice concerns regarding inspection operations. This would help to ensure that changes in airport operations assist,

or at least do not hinder, the alien species interdiction system. This measure would be moderately effective against alien species (Table 3).

11) *Brown Tree Snake Control Plan.* The State of Hawaii presently participates in inspections of aircraft arriving from Guam, and partly funds a rapid response task force on Oahu to prevent establishment of populations. Any future application of improved methods for brown tree snake control in Hawaii would benefit from prior review by HDOTA. This measure in itself would have no effect on alien species introductions.

12) *Alien Arthropod Detection and Response.* Semi-annual surveys of the airport environs will establish a baseline checklist of alien insect species. This baseline and periodic monitoring should allow detection of any incipient populations of new alien insects. Snakes newly escaped from aircraft might also be detected during surveys. Eradication will be attempted for all new species of insects confined to the airport environs, although the likelihood of success may vary due to characteristics of various insect groups. This measure should be highly effective against the permanent establishment of stowaway ants, and moderately effective against stowaway flying insects (Table 3).

Human commerce and personal travel inevitably carry alien species to Maui. Therefore, any increase in direct overseas flights to Maui increases the rate of arrival of alien species, albeit by an amount that is presently unquantifiable. The rate of introduction of alien species is a product of the rate of arrival at ports of entry and the efficiency of interception. The alien species prevention and interception features of this project are not presently operative at Kahului Airport. Operation of these features, combined with the present protocols of the USDA and HDOA inspectors, and assuming adaptive improvement of the system based on quality control results, should make Kahului Airport a better barrier to invasion by alien species than any other airport in Hawaii.

Cumulative Effects

Cumulative effects are those impacts of future State, local and private actions affecting endangered or threatened species or critical habitat that are reasonably certain to occur within the action area considered in this biological opinion. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act, and therefore, are not considered cumulative to the proposed action.

a) *Actions affecting listed species or critical habitat:* Accidental and illegal introductions of alien species to Maui will undoubtedly continue into the foreseeable future, independent of the proposed action. A reasonable worst-case projection for the next decade, in the absence of stringent [illegible]tine at all points of entry or very effective public education, would be on the order of 10 [illegible]rate (mainly insect) species per year (Fern Duvall, DOFAW, personal communication [illegible]3 species of plants per year, and 2-5 vertebrate species per decade (Fern Duvall, DOFAW, personal communication 1997), based on Statewide averages and recent history. Some alien birds may colonize naturally from other invaded islands, but most species would be introduced by human

activities. Because of the lag phase typical of newly established populations, the invasive potential of these species may take years to become manifest. In the meantime, some little-noticed alien species already present on Maui will begin to spread into native-dominated systems and affect native species. No effective system exists to catalog these species, monitor their effects on native species, or control the spread of more than a handful of the most noxious plants and conspicuous vertebrates.

In the future, it is experted that current State, local, and private actions aimed at recovery of native species and ecosystems on Maui will continue and in some cases be expanded. These include many of the conservation measures described in the Environmental Baseline section.

b) *Actions targeting alien species.* Most of the ongoing State and local conservation actions mentioned above include efforts to control and contain established alien species, especially ungulates and invasive plants.

To help deal with the continuing influx of new alien species, the Governor of Hawaii and Hawaii's Congressional delegation in October 1996 launched a major, ongoing public awareness campaign to inform residents and visitors about the importance of preventing alien pests from reaching Hawaii. Funding has been provided for educational displays that will be permanently installed in the baggage claim areas of all major airports, including Kahului Airport. Displays will feature a message designed to alert passengers that they could be carrying harmful organisms and to encourage them to have any living materials inspected. These displays will be updated periodically and will be self-financing by means of corporate sponsorships.

Conclusion

After reviewing the current status of the endangered, threatened, and proposed endangered species on Maui, the environmental baseline for the action area, the effects of the proposed Kahului Airport Improvements and the cumulative effects, it is the Service's biological opinion that the Kahului Airport Improvements, including its "state of the art" alien species interdiction features, are not likely to jeopardize the continued existence of any endangered, threatened, or proposed endangered species on Maui, and are not likely to destroy or adversely modify the designated critical habitat of *Gouania hillebrandii.*

INCIDENTAL TAKE

Sections 4(d) and 9 of the Act, as amended [illegible] harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or atte[illegible] [illegible]nduct) of listed species of fish and wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding and sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding or sheltering. Incidental

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take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant.

Sections 7(b)(4) and 7(o)(2) of the ESA do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the ESA requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any action that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any State law.

Introductions of alien species as a result of this project, although unlikely, would be practically irreversible and could have catastrophic consequences for one or more listed species included in this biological opinion. Therefore, any incidental taking that results from such an introduction is not authorized.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for these species.

The FAA Honolulu Airports District Office should participate as a resource to the Consulting Group on Alien Pest Species. This would enhance communication about alien species issues and enable alien species control to be more fully integrated with airport development. The Service would like to see efforts to pursue changes in Federal law to clarify the need to utilize airport revenues for future funding of additional inspectors as necessary.

Transport of alien species via aircraft is of potential concern throughout the nation and consideration should be given to development of a Programmatic section 7 consultation between the FAA and the Service to address this issue nationwide.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation Notice

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) new

information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 3) a new species is listed or critical habitat designated that may be affected by the action.

Specific circumstances that would require reinitiation include, but are not limited to:

1) Lack of all alien species control measures in effect prior to completion of Phase I.

2) Lack of implementation of significant changes recommended in the annual quality control review within two years, where the recommended [illegible] ntly impede processing of passengers, baggage or cargo or comprom[illegible]

The Service appreciates the considerable [illegible] and effort that your agency, along with your consultants, has given to addressing Service concerns about this project. If you have any questions concerning the information contained in this biological opinion, please contact our Program Leader for Interagency Cooperation, Ms. Margo Stahl, or Fish and Wildlife Biologist Dr. Jeff Burgett at 808/541-3441.

Sincerely,

Brooks Harper

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Field Supervisor
Ecological Services

cc: USFWS, Region I

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CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING

Clark, D.R., R.K. LaVal, and D.M. Swineford. 1978. Dieldrin-induced mortality in an endangered species, the gray bat. Science 199: 1357-1359.

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TABLE 1. LISTED SPECIES OF PLANTS ON MAUI, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT.

Species status by island: E= endangered, T= threatened, P= formally proposed as E or T, *=possibly extinct in the wild, + =in cultivation, (CH)=critical habitat declared on Maui		Status				Distribution	
		Status	Listing Date	Recovery plan (F=final; D=draft)	Total Pop. (approx)	Maui	found on other islands
Abutilon menziesii	Ko'oloa'ula	E	1986	F	350-400	✓	✓
Acaena exigua	Liliwai	E	1992	D	0	✓*	✓*
Alectryon macrococcus var. auwahiensis	Mahoe	E	1992	D	9	✓	
Alectryon macrococcus var. macrococcus	Mahoe	E	1992	F	<300	✓	✓
Argyroxiphium sandwicense ssp. macrocephalum	'Ahinahina, Haleakala silversword	T	1992	D	65,000	✓	
Asplenium fragile var. insulare	No common name	E	1994	D	295	✓*	✓*
Bidens micrantha ssp. kalealaha	Ko'oko'olau	E	1992	D	<2,000	✓	✓
Bonamia menziesii	No common name	E	[illegible]	D	200	✓	✓
Brighamia rockii	Pua 'ala			D	100-200	✓*	✓*
Caesalpinia kavaiensis	Uhiuhi			F	<100	✓*	✓
Cenchrus agrimonioides var. agrimonioides	Kamanomano	+	1996	F	<100	✓	✓
Centaurium sebaoides	'Awiwi	E	1993	D	80-110	✓	✓
Clermontia lindseyana	'Oha wai	E	1994	F	225-325	✓	✓
Clermontia oblongifolia ssp. mauiensis	'Oha wai	E	1992	F	1	✓	✓
Clermontia peleana ssp. singulifolia	'Oha wai	E	1994	D	0	✓*	✓
Cenia squamigera	Pauoa	E	1994	F	80	✓	✓
Cyanea lobata	Haha	E	1992	D	0	✓*	✓
Cyanea grimesiana ssp. grimesiana	Haha	E	1996	D	<50	✓	✓
Cyanea mceldowneyi	Haha	E	1992	D	>144	✓	
Delissea undulata ssp. undulata	No common name	E	1996	F	1	✓*	✓
Delissea erecta	No common name	E	1994	D	63	✓	✓
Diplazium molokaiense	No common name	E	1994	D	1	✓	✓
Flueggea neowawraea	Mehamehame	E	1994	D	127-167	✓	✓
Gardenia brighamii	Nanu	E	1985	F	15-19	✓*	✓
Geranium arboreum	Nohoanu	E	1992	D	>300	✓	
Geranium multiflorum	Nohoanu	E	1992	D	<3,000	✓	
Gouania hillebrandii	No common name	E (CH)	1984	F	1,700-	✓	✓
Gouania vitifolia	No common name	E	1994	F	3	✓*	✓
Haplostachys haplostachya	No common name	E	1979	F	>10,000	✓*	✓
Hedyotis coriacea	Kio'ele	E	1992	D	<20	✓	✓
Hedyotis mannii	No common name	E	1992	F	11	✓	✓
Hesperomannia arborescens	No common name	E	1994	F	<60	✓	✓
Hesperomannia arbuscula	No common name	E	1991	F	86	✓	✓
Hibiscus brackenridgei ssp. brackenridgei	Ma'o hau hele	E	1994	D	<60	✓	✓
Ischaemum byrone	Hilo ischaemum	E	1994	F	1,200-	✓	✓
Isodendrion pyrifolium	Aupaka, wahine noho kula	E	1994	F	60-70	✓*	✓
Lipochaeta kamolensis	Nehe	E	1992	D	<200	✓	
Lysimachia lydgatei	No common name	E	1992	D	150-250	✓	
Marsilea pensaliformis ssp. pensaliformis	No common name	E	1994	D	100	✓	✓
Melicope adiscendens	Alani	E	1994	D	4	✓	
Melicope bellonii	Alani	E	1994	D	<300	✓	
Melicope knudsenii	Alani	E	1994	F	24-34	✓	✓
Melicope mucronulata	Alani	E	1992	D	<5	✓*	✓
Melicope ovalis	Alani	E	1994	D	>300	✓	
Neraudia sericea	No common name	E	1994	D	100-150	✓	✓
Notostichum humile	Kulu'i	E	1991	F	1,500-	✓	✓
Panicum fauriei var. carteri	Carter's panic grass	E	1983	F	>400	✓	✓
Peucedanum sandwicense	Makou	T	1994	F	1,000-	✓	✓

TABLE 1. LISTED SPECIES OF PLANTS ON MAUI, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT.

Species status by Island: E= endangered; T= threatened; P= formally proposed as E or T; *=possibly extinct in the wild; + =in cultivation; (CH)=critical habitat declared on Maui.

		Status				Distribution	
		Status	Listing Date	Recovery plan (F=final; D=draft)	Total Pop. (approx)	Maui	found on other islands
Phlegmariurus mannii (= *Lycopodium mannii*)	Wawae'iole	E	1992	D	<300	✓	✓
Phyllostegia mannii	No common name	E	1992	F	<10	✓*	✓
Phyllostegia mollis	No common name	E	1991	F	50-100	✓	✓
Phyllostegia parviflora var. *parviflora*	No common name	E	1996	D	4	✓*	✓
Plantago princeps var. *laxiflora*	Ale	E	1994	D	100	✓	✓
Platanthera holochila	No common name	E	1996	D	<40	✓	✓
Pteris lidgatei	No common name	E	1994	D	34	✓	✓
Remya mauiensis	No common name	E	1991	D	9	✓	
Sanicula purpurea	No common name	E	1996	D	125-200	✓	✓
Santalum freycinetianum var. *lanaiense*	Iliahi; sandalwood	E	1956	F	>100	✓	✓
Scaevola coriacea	Dwarf naupaka	E	1984	D	<300	✓	✓
Schiedea haleakalensis	No common name	E	1992	D	100-200	✓	
Schiedea hookeri	No common name	E	1996	D	220-400	✓*	✓
Schiedea salicaria	'Ohai	E	1994	D	2,120-	✓	✓
Solanum incompletum	Popolo ku mai	E	1994	D	0	✓*	✓
Spermolepis hawaiiensis	No common name	E	1994	D	1,000-	✓	✓
Stenogyne angustifolia	No common name	E	1979	F	>50,000	✓*	✓
Tetramolopium arenarium ssp. *arenarium*	No common name	E	1994	F	125	✓*	✓
Tetramolopium arenarium ssp. *latum*	No common name	E	1994	F	0	✓*	
Tetramolopium capillare	No common name	E	1994	D	130-150	✓	
Tetramolopium remyi	No common name	E	1991	F	1	✓*	✓
Vigna o-wahuensis	No common name	E	1994	D	<100	✓	✓
Zanthoxylum hawaiiense	A'e	E	1994	F	166	✓	✓

TABLE 2. LISTED AND PROPOSED SPECIES OF ANIMALS ON MAUI, AS DESIGNATED UNDER THE U.S. ENDANGERED SPECIES ACT

Species status: E=endangered, T=threatened, P=formally proposed as E or T; (CH)=Critical Habitat designated on Maui; * =possibly extinct; # =extremely rare

		Status			Distribution	
		Status	Listing Date	Recovery Plan (F=final; D=draft)	Maui	Found on Other Islands
VERTEBRATES						
LISTED MAMMALS						
Lasiurus cinereus semotus	Bat, Hawaiian hoary, 'Ope'ape'a	E	1970		✓	✓
Monachus schauinslandi	Hawaiian monk seal, 'Ilio-holo-i-ka-uaua	E	1976	F	✓	✓
LISTED BIRDS						
Anas wyvilliana	Duck, Hawaiian, Koloa maoli	E	1967	F	✓*	✓
Branta (= *Nesochen*) *sandvicensis*	Goose, Hawaiian; Nene	E	1967	F	✓	✓
Fulica alai	Coot, Hawaiian; 'Alae ke'ke'o	E	1970	F	✓	✓
Gallinula chloropus sandvicensis	Moorhen, Common, Hawaiian gallinule; 'Alae 'ula	E	1967	F	✓*	✓
Hemignathus lucidus affinis	Nukupu'u, Maui	E	1967,	F	✓*	
Himantopus mexicanus knudseni	Stilt, Black-necked, Hawaiian stilt; Ae'o	E	1970	F	✓	✓
Loxops coccineus ochraceus	'Akepa, Maui; 'Akepa'ae	E	1970	F	✓*	
Melamprosops phaeosoma	Po'ouli	E	1975	F	✓#	
Palmeria dolei	Honeycreeper, Crested, 'Akohekohe	E	1967	F	✓	
Pseudonestor xanthophrys	Parrotbill, Maui	E	1967	F	✓	
Psittirostra psittacea	Ō'ū	E	1967	F	✓*	✓
Pterodroma phaeopygia sandwichensis	Petrel, Dark-rumped, Hawaiian petrel; 'Ua'u	E	1967	F	✓	✓
LISTED REPTILES						
Caretta caretta	Turtle, Loggerhead sea; (incidental in Hawai'i)	T	1978	F	✓	✓
Chelonia mydas	Turtle, Green sea, Honu	T	1978	F	✓	✓
Dermochelys coriacea	Turtle, Leatherback sea; (incidental in Hawai'i)	E	1970	F	✓	✓
Eretmochelys imbricata	Turtle, Hawksbill, 'Ea	E	1970	F	✓	✓
Lepidochelys olivacea	Turtle, Olive ridley sea; (incidental in Hawai'i)	T	1978	F	✓	✓
INVERTEBRATES						
CANDIDIATE ARTHROPODS						
Manduca blackburni	Moth, Blackburn's sphinx	PE			✓#	

TABLE 3. VULNERABILITES OF EXAMPLE TAXA TO GROUPS OF ALIEN SPECIES

Native Taxon	Vertebrate predators	Vertebrate herbivores	Social insects & invertebrate predators	Blood-sucking invertebrates & diseases	Invertebrate herbivores	Competetive plants
Haleakala silversword	P	X	X		X	X
Gouania hillebrandii	P	X	X		X	X
Hawksbill sea turtle	X		X	P		X
Hawaiian hoary bat	X	P	X	X	P	
Blackburn's sphinx moth	X	X	X		X	X
Nene	X	P	P	X	P	P
Crested honeycreeper	X	P	X	X	P	P
Hawaiian stilt	X		X	X		X
Dark-rumped petrel	X	P	X	X		

X=highly vulnerable
P= potential threat

Table 4: Predicted Effectiveness of Proposed Measures Against Various Alien Species Threats (adapted from BA Appendix E)

Measure	Smuggled Vertebrates	Stowaway Snakes	Stowaway Ants	Smuggled Ants	Insects on Plants, in Soil	Flying insects in cargo hold	Smuggled Plants	Inadvertent Plants
1&4: Traveller Education	med-high	low	0	high	high	low	med-high	med
3: Cargo Hold Treatment *	0	0	med-high	0	0	high	0	0
5. Airport Staff Training	med-high	med	med	med	med	med	med	med
6: Inspection Facilities	med	med-high	med-high	med-high	med-high	med	med	low-med
7: Domestic Inspectors	high	high	low-med			low	med-high	low
8: Cargo Building	med-high	med	med-high	med-high	med-high	med	med-high	low-med
9. Quality Control Program	med-high	med-high	med-high	med-high	med-high	med-high	med-high	med-high
10: Security Committee **	med	med	med	med	med	med	med	med
12: Arthropod Surveys	0	low	high	0	0	med	0	0

* If implemented by all airlines; otherwise low effectiveness.
** If adopted, otherwise zero effectiveness

Table 5
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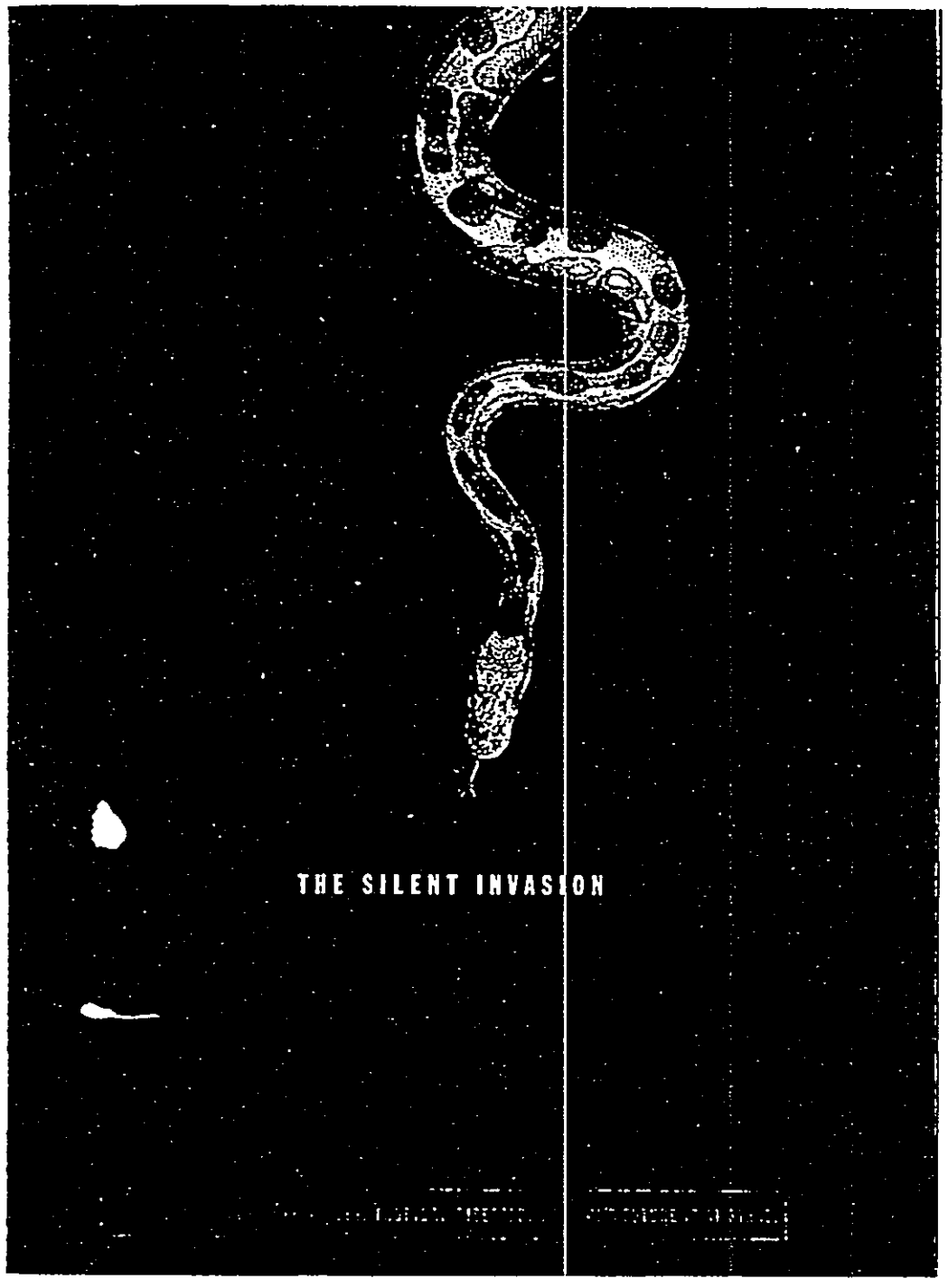


THE SILENT INVASION OF

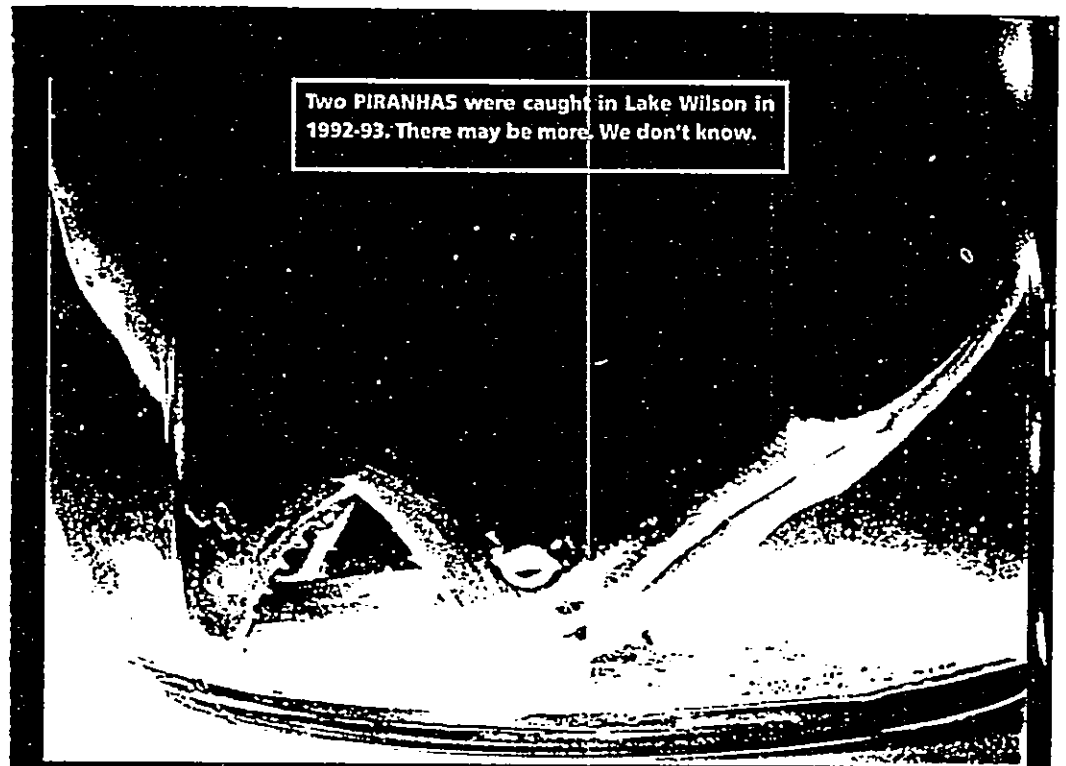
Hawai'i by insects, disease organisms, snakes, weeds, and other pests is the single greatest threat to Hawaii's economy and natural environment and to the health and lifestyle of Hawaii's people. Pests already cause millions of dollars in crop losses, the extinction of native species, the destruction of native forests, and the spread of disease. But many more harmful pests now threaten to invade Hawai'i and wreak further damage. Even one new pest—like the brown tree snake—could forever change the character of our islands. Stopping the influx of new pests and containing their spread is essent to Hawaii's future well-being.

Despite the efforts of more than 20 state, federal, and private agencies, unwanted alien pests are entering Hawai'i at an alarming rate – about 2 million times more rapid than the natural rate. In 1994, the federal Office of Technology Assessment declared Hawaii's alien pest species problem the worst in the nation. Hawaii's evolutionary isolation from the continents, and its modern role as the commercial hub of the Pacific make these islands particularly vulnerable to destruction by alien pests. Gaps in current pest prevention systems and a lack of public awareness add further to this serious problem.

The present problem is severe. The future could be even more dire. Slow, incremental action will not be sufficient. Dramatic improvements must be made now to stem the invasion of alien pests. Only committed political leadership and widespread public support can preserve Hawaii's environment, lifestyle, and economy.

THE THREAT IS URGENT. OUR FUTURE IS T RISK. STOP THE ALIEN ONSLAUGHT.

What is Alien?



Two PIRANHAS were caught in Lake Wilson in 1992-93. There may be more. We don't know.

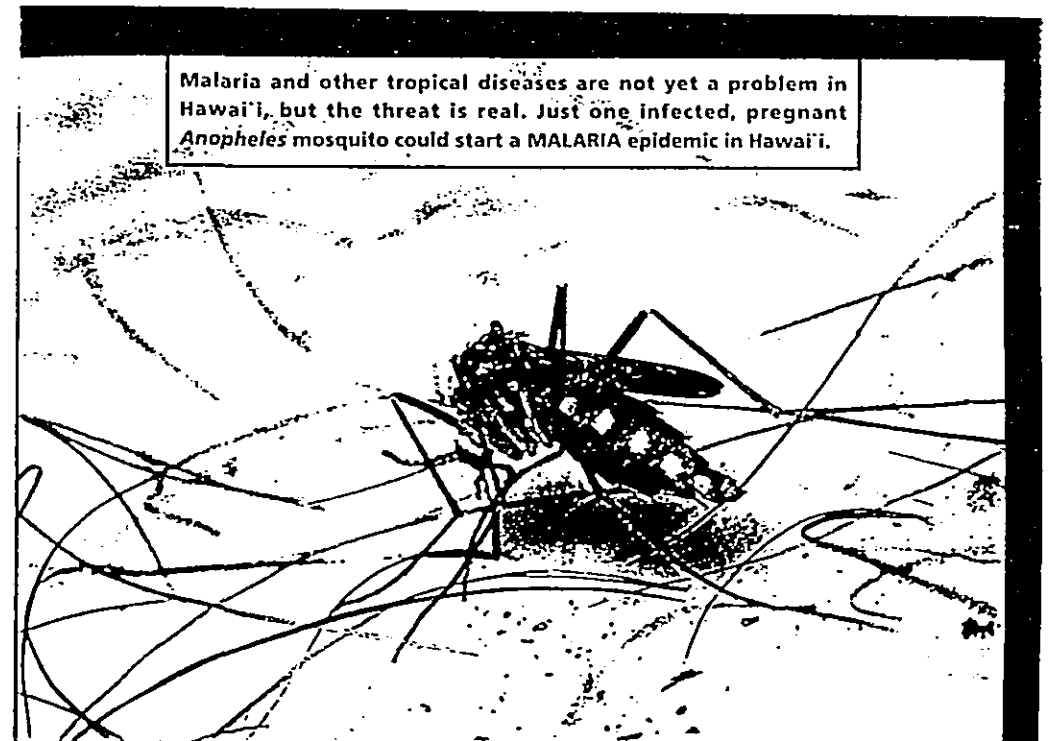
WHY SHOULD YOU WORRY?

Experts say that without significant improvements in prevention systems, it is only a matter of time before the brown tree snake establishes itself in Hawai'i. Accidentally introduced to Guam in the late 1940's, this snake causes, on average, one power outage every four days. It has devastated Guam's native bird population. Two hundred people have been treated for bites from this aggressive, venomous snake, which can cause respiratory failure in infants. The brown tree snake has already made its way to Hawai'i at least six times as a stc way on aircraft and in cargo from Guam. For.. ately, these were caught by the system; but even one pregnant female snake slipping through could devastate Hawaii's economy, environment, visitor industry, and quality of life.

A single alien pest that slipped through our borders—the Formosan ground termite—now causes nearly $150 million in treatment and damage repair costs annually, most of which is paid by private homeowners. By comparison, the combined budget of all government pest prevention programs to protect Hawai'i is only $25 million. Although Hawai'i now has four kinds of damaging termites, there are more than 2,000 termite species in the world, including many destructive species that could thrive in Hawaii's agreeable climate.

Each year, an average of 20 new alien insects make their way to Hawai'i, half of which are known pests. For Hawaii's farmers it is becoming impossible to cope with the number of new pests. They are being forced to increase pesticide use, change crops, or quit farming altogether. The agriculture industry estimates it is losing $300 million per year in revenue from potential markets that now refuse Hawai'i exports because of alien fruit flies that infest many island crops.

More than one-third of all the threatened and endangered plants and birds in the entire U.S. live only in Hawai'i. For more than 95% of these 282 imperiled Hawaiian species, alien competitors, diseases, or predators are a primary threat. As new pests pour into our forests, streams, and coastal waters, the number of native species threatened with extinction is increasing faster than conservation programs can protect them.



Malaria and other tropical diseases are not yet a problem in Hawai'i, but the threat is real. Just one infected, pregnant *Anopheles* mosquito could start a MALARIA epidemic in Hawai'i.

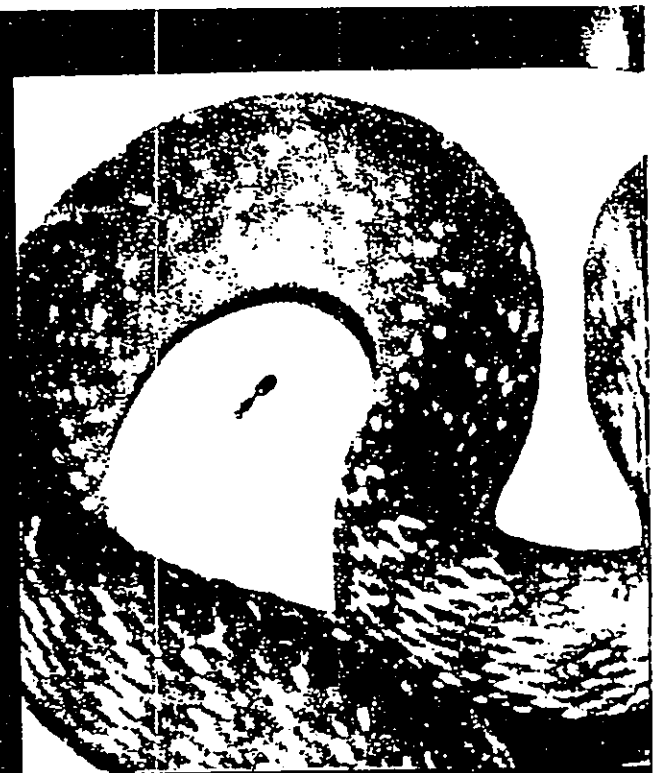
WHAT SHOULD YOU KNOW?

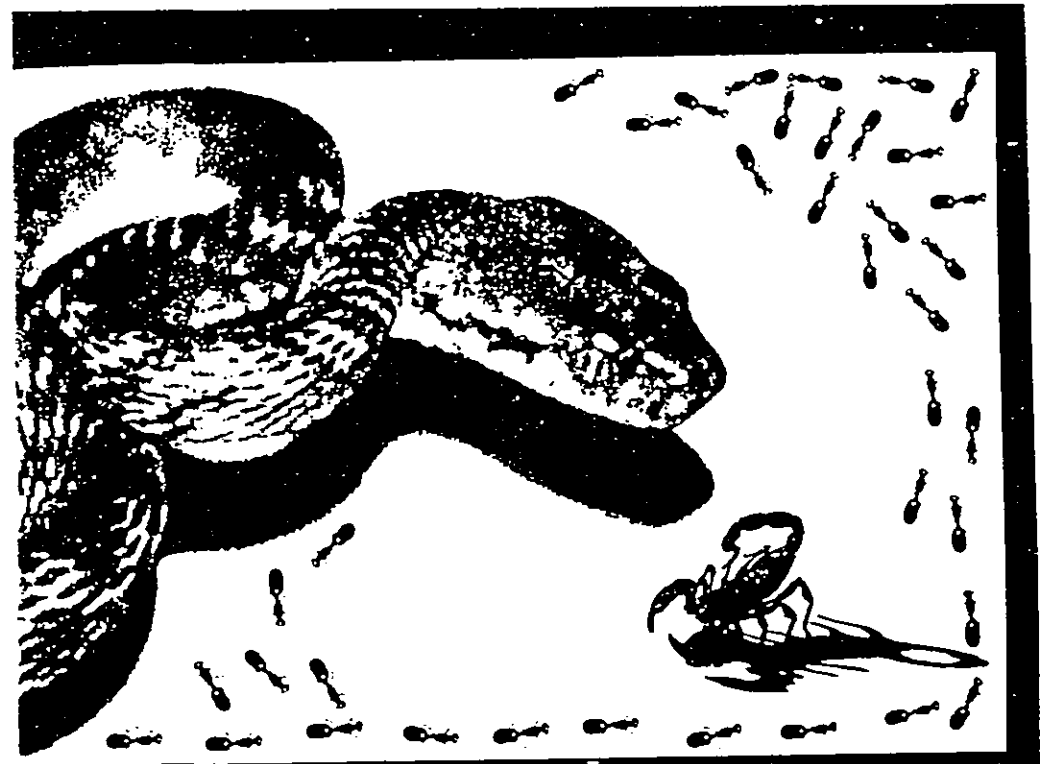
Malaria and many other tropical diseases are not yet a problem in Hawai'i, in part because we do not yet have the mosquito species that carry these diseases between hosts. But the threat of additional mosquitoes reaching the islands is very real. The Health Department has collected 104 different species of mosquitoes from aircraft landing in Honolulu.

Because of these and hundreds of other examples, THERE IS WIDESPREAD AGREEMENT AMONG FARMERS, SCIENTISTS, GOVERNMENT AGENCIES, BUSINESS PEOPLE, AND OTHERS THAT STOPPING THE INFLUX OF NEW PESTS IS ESSENTIAL to Hawaii's future well-being.

THE JOY OF BEING IN HAWAI'I has much to do with our pleasant, non-threatening environment. But many of the diseases, nuisance insects, and other pests that make most tropical areas in the world less attractive than Hawai'i would thrive here if they ever reached our shores.

SOME ALREADY HAVE.





THE POTENTIAL IMPACT OF NEW PESTS ON OUR HEALTH AND LIFESTYLE IS IMMENSE.

RED FIRE ANTS

almost made their way to Hawai'i in 1991 when agricultural inspectors in Honolulu intercepted an infested mail parcel from Florida. These ants send more than 20,000 people from the U.S. to doctors each year. In 1989, 32 people died from allergic reactions to the ants' toxic stings. Fire ants are voracious predators of beneficial insects and destroy germinating seeds, flowers, and young fruit of many crop plants. They are capable of killing ground-nesting birds and small animals, and killing trees by girdling their trunks. Fire ants are particularly fond of well-manicured turf grasses, such as golf courses, and wreak havoc on drip-irrigation systems by gnawing apart drip lines.

SCORPIONS

Because of restrictions placed on inspecting First Class mail, many dangerous and potentially devastating species, such as piranhas, giant emperor scorpions, and venomous spiders reach Hawai'i through the illegal mail-order pet trade.

SEVERAL OTHER SNAKE SPECIES HAVE ALREADY PROVEN THEIR ABILITY TO INVADE ISLANDS WITH DEVASTATING EFFECT. WE MUST GUARD AGAINST THEM ALL.

THE BROWN TREE SNAKE

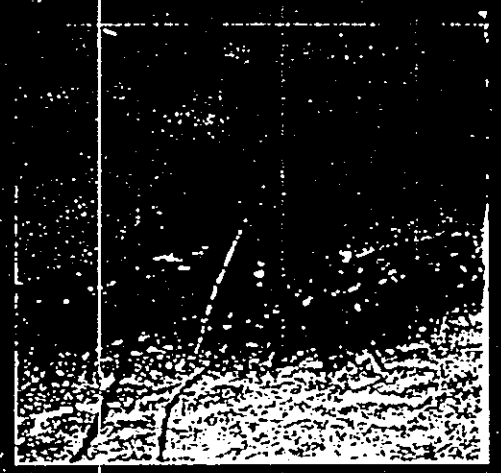
For many Hawai'i residents and visitors, the fact that our islands have no snakes (other than the small, earthworm-like blind snake) is a source of tremendous comfort. The people of Guam felt the same way before they were invaded by the brown tree snake. Of the more than 200 people treated in Guam emergency rooms for snakebites, most (84%) were bitten at night while asleep in bed. On more than one occasion, parents checking on a crying baby have been horrified to find an eight foot snake coiled around the child, the baby's hands punctured and swollen from repeated bites.

Snakes on Guam are also responsible for power outages every four days on average. Considering the conservative cost estimate of $13 million for a major O'ahu power outage triggered by a fallen tree branch in April 1991, the prospect of frequent snake-induced outages in Hawai'i is a costly one.

Although they'll eat anything from lizards to garbage to hamburgers straight from the grill, the brown tree snake's preferred prey is birds. The brown tree snake has already wiped out 9 of Guam's 11 native land bird species and most of the non-native birds as well. Hawai'i has already lost half of its native birds to extinction, and if the brown tree snake makes its way here, many of Hawaii's birds would inevitably be wiped out as well.

While the brown tree snake is the most imminent threat to Hawai'i today, there are an estimated 1,000 other snake species in the world that could pose a threat. State inspectors captured 32 snakes and nearly 100 other illegal reptiles and amphibians in Hawai'i during 1994 alone.

BELOW: **32 PEOPLE DIED IN THE U.S.** IN 1989 FROM ALLERGIC REACTIONS TO FIRE ANT TOXINS.
RIGHT: BITING SAND FLIES CAN INFLICT UP TO **10,000 BITES PER PERSON PER DAY.**



KILLER BEES, FLESH-EATING FISH, VENOMOUS SNAKES...IT COULD HAPPEN HERE.

BITING SAND FLIES

A NIGHTMARE FOR BEACHGOERS

Imagine walking out on Waikiki beach on a perfect, sunny day. You stretch out on the sand, and within seconds you are engulfed in a swarm of tiny, biting flies. They bite your arms and legs, burrow into your ears and eyelids, and even find their way under your swimsuit. Each bite becomes a raised welt that itches for a week or more. You retreat to the beachside restaurant. They follow. You resort to repellent, and find you need to reapply it every hour just to slow them down. Your kids can't stop scratching their bites, and have dozens of infected sores on their legs and ankles.

SCIENCE FICTION? Not really! The threat of biting flies in Hawai'i is very real.

On May 2, 1995, three canoes in the historic Polynesian voyaging fleet sailing from the Marquesas to Hawai'i reported biting flies on board. The crews had seen for themselves the swarms of these no-no flies at beaches and streams on Nuku Hiva, and the infected sores on the legs of bitten Marquesan children. These tiny, voracious flies breed in beach sand or in streams, and are most active on sunny days. Peak swarms can inflict up to 10,000 bites per person per day. Millions of dollars have been spent trying to control the flies in the Marquesas with little success; complete eradication is regarded as impossible. Fortunately for Hawai'i, the crews of the canoes understood the severity of the situation and took great pains to destroy these flies before they reached our islands.

At least one resort development in the Caribbean learned about biting sand flies the hard way. On the day of the resort's debut before an invited horde of travel agents, the flies completed their seasonal reproductive cycle in marshy areas created by the hotel's construction work. The visiting travel reps were the first course for the flies' feeding season, and the new resort never recovered from the bad press.

The most likely way for biting flies to reach Hawai'i would be aboard aircraft or ships from fly-infested regions that might carry wet sand, soil, or plant material where the flies breed. Once here, drastic control measures including poisoning and re-engineering of beaches to minimize breeding habitat would be needed to keep the flies from driving sunbathers and beachside diners away.

[illegible] cargo containers [illegible] 1991 [illegible] fortunately, [illegible]

[illegible] have now spread north to California, greatly increasing the chances of their growing aware on ships bound for Hawai'i. In Latin America these bees have caused many fatal human deaths and [illegible] medical treatment.

Hawai'i currently has no malaria-carrying mosquitoes. But with the frequency of air travel to Hawai'i and the capacity of mosquitoes to survive in cargo containers, it is [illegible] entirely possible that they could make their way here.

In 1992, quarantine officers confiscated 39 piranhas (flesh-eating fish) from the Amazon from Hawai'i aquarium enthusiasts who had purchased the deadly pets from a mainland mail-order house. A state officer required [illegible] after he was bitten by one of the [illegible] fish. Two piranhas have already been found in our waterways. Should they thrive in our streams and lakes, [illegible]

"THERE IS A MAJOR COST ASSOCIATED WITH THE INTRODUCTION OF PEST SPECIES. I AM CONCERNED ABOUT THE FUTURE OPTIONS WE MAY BE FORECLOSING ON AS A RESULT OF THE DAMAGE PEST SPECIES ARE CAUSING TODAY."
PAUL BREWBAKER, CHIEF ECONOMIST, BANK OF HAWAI'I

"ONE OF THE GREATEST, UNSUNG ADVANTAGES WE HAVE AS A VISITOR DESTINATION IS ALL THE THINGS WE DON'T HAVE—SNAKES, BITING FLIES, TROPICAL DISEASES. AS WE WORK TO ATTRACT MORE VISITORS, IT IS CRITICAL THAT WE ALSO KEEP THESE PESTS OUT." PAUL CASEY, PRESIDENT, HAWAI'I VISITORS BUREAU

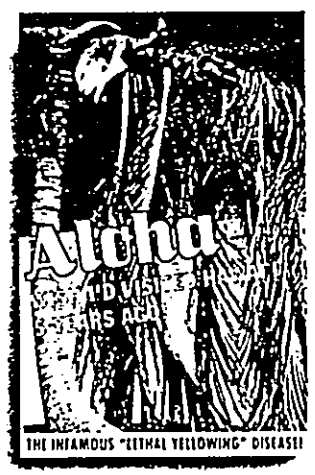
HAWAII'S VISITOR INDUSTRY IS AT RISK.

THE VISITOR INDUSTRY

The visitor industry is the backbone of Hawaii's economy, generating $18.9 billion in total sales, 30% of all state and county taxes ($1.1 billion), and 37% of all civilian jobs in 1994.

Hawaii's visitor industry is largely dependent on the islands' image as a paradise with one of the world's safest and most pleasant outdoor environments – fantastic weather, clean beaches and water, and no dangerous snakes, insects, or tropical diseases to worry about. But these and other pest species threaten Hawaii's borders every year; if any sneak through, they could permanently tarnish this image and pose real threats to the engine that drives Hawaii's economy.

THE FUTURE LOOK OF HAWAI'I TOURISM? THESE MAKE-BELIEVE PRODUCTS COULD BECOME REALITY IF WE ALLOW NEW PESTS TO INVADE OUR ISLANDS AND EMPTY OUR BEACHES.



THE POSTCARD AT LEFT SHOWS WHAT THE LETHAL YELLOWING DISEASE CAN DO TO A COASTLINE OF COCONUT TREES. IMAGINE A HAWAI'I WITHOUT PALM TREES.

"WE'RE IN REAL TROUBLE. EVERY INFECTED PAPAYA TREE IS PULLING INCOME FROM OUR POCKETS AND FOOD OFF OF OUR TABLES. I KNOW SOME FARMERS WHO HAVE LOST EVERYTHING."
WILLIAM JULIAN,
BIG ISLAND PAPAYA GROWER

"IF IT ISN'T ONE PEST IT'S ANOTHER. AS SOON AS WE GET A HANDLE ON ONE THING, ANOTHER COMES ALONG. IT'S VERY DISCOURAGING."
PAUL HIGASHINO, MAUI TARO FARMER

MORE PESTS PER ACRE = DIRE FUTURE FOR FARMERS

SICKLY CROPS AND THRIVING PESTS

The agricultural industry is Hawaii's third largest revenue source, grossing nearly $1 billion per year. Pests already established in Hawaii are responsible for large losses in damaged agricultural crops and lost markets. New pests are a constant threat. With the downsizing of sugar and pineapple, **these new pests are a major threat to the future of diversified agriculture in Hawai'i.**

Since 1985, four new sugarcane insect pests have become established in Hawai'i, costing sugar planters more than $9 million.

Alien snails, insects, viruses, and other pests threaten the resurgence of taro (already a $2 million industry statewide) as an agricultural commodity and the staple of traditional Hawaiian diet. **The taro root aphid causes 90% crop loss in dryland taro.** Big Island taro growers are already battling this pest, and it spread to O'ahu farms for the first time in late 1994. The only treatment for taro root aphid: removal of all taro from the infested field for at least one year.

Many of Hawaii's most promising crops are struggling under a siege of alien pests. Anthurium growers battle bacterial blight which has caused a **40% decline** in statewide production since 1980. Several ginger root farmers have suffered **60-70% crop loss** due to a bacterial wilt that first appeared in 1991. An alien root aphid on Maui is causing **crop losses of 20-90%** in affected cabbage, broccoli, and cauliflower crops.

Site-tied flies have made their way to Hawai'i, restrictions have been placed on the export of papaya, major exhibition produce to mainland markets (like California) and than the papaya industry by value (leading potential market at $50 million per year).

The papaya ringspot virus weakens the papaya tree and ruins the fruit. The virus contains an end to large-scale papaya production on the Big Island valued at $16 million annually and amounting $200 farmers. The papaya is the largest commodity in the state, [illegible] $50 million [illegible] in sugar [illegible].

ALIEN PESTS ARE THE #1 THREAT TO OUR WATERSHEDS AND NATIVE WILDLIFE

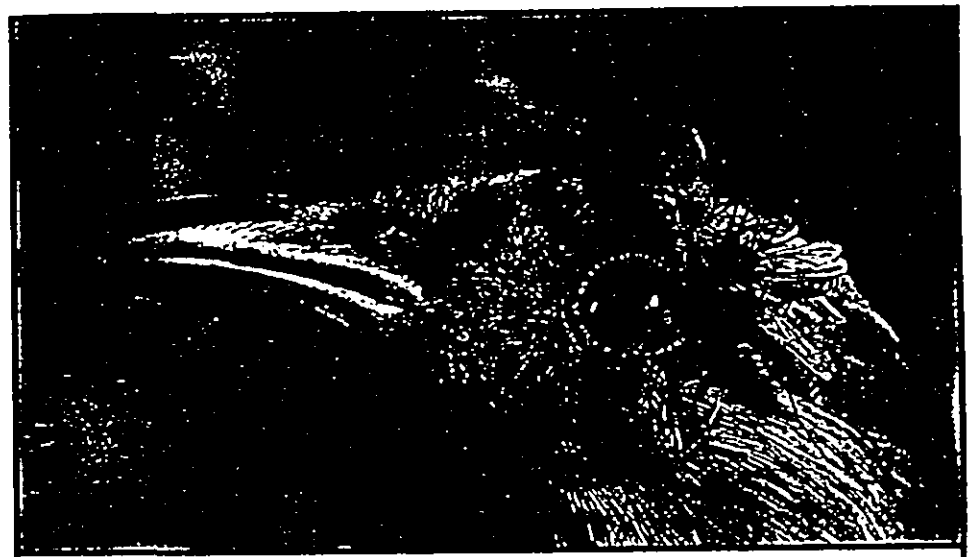
"EACH TIME WE LOSE ANOTHER HAWAIIAN PLANT OR BIRD OR INSECT OR FOREST, WE LOSE A LIVING PART OF OUR ANCIENT CULTURE. STOPPING ALIEN PESTS IS ABOUT CHOOSING OUR FUTURE AND SAVING OUR PAST."

NAINOA THOMPSON,
POLYNESIAN VOYAGING SOCIETY

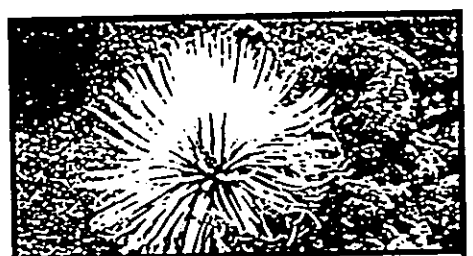
HAWAI'I IS HOME TO 38% OF THE NATION'S THREATENED AND ENDANGERED PLANTS AND 41% OF ITS ENDANGERED BIRDS.

Hawai'i is also home to the only tropical rain forests in the 50 states; half of these rain forests are already gone. The single greatest threat to the survival of Hawaii's remaining forests and the native wildlife they support is the destruction caused by non-native species. Non-native species prey upon and destroy habitat for native species, compete with them for food and habitat, and spread foreign diseases to native plants and animals.

State, federal, and private managers of Hawai'i nature reserves spend more than 75% of their resources to prevent the spread of these pests and repair the damage they cause. The flow of new pests into the state is a constant threat to the survival of Hawaii's precious natural resources.



Introduced mosquitoes spread avian malaria and other diseases that have devastated Hawaii's native birds in many lowland areas. Although the mosquitoes we have now do not commonly survive above 5,000 feet elevation in Hawai'i, there are many mosquito species in the world that could spread into these last, high-elevation forest refuges. At stake for these birds is the survival of their entire species.



Saved from feral goats and pigs by a decade of fencing and hunting, the Haleakala silversword is now threatened by the Argentine ant, which probably hitched a ride to Hawai'i in foreign cargo. In parts of the silversword's last stronghold on Maui, these ants are wiping out the native bees and other insects that this spectacular plant depends on for pollination.

Hawaii's forests and other natural areas have been and continue to be invaded by non-native weeds which choke out and compete for sunlight with native species. Banana poka, an attractive non-native vine introduced to Hawai'i from South America, has smothered over 70,000 acres of prime native forest. Hardest hit have been the state's precious koa forests, which supply Hawaii's most renown cabinetry wood and support many rare birds and plants.

Non-native pigs, goats, deer, and sheep have spread into virtually every watershed in the state. Where they root and trample, they destroy native vegetation, accelerate erosion and pollute the water supply with eroded silt, feces, and foreign diseases. Pigs eat the nestlings of ground-nesting birds, and their wallows create breeding sites for foreign mosquitoes, which spread deadly diseases to Hawaii's endangered forest birds

AWAI'I RELIES ON ITS RAIN FORESTS FOR ALMOST ALL OF ITS FRESH WATER. AS ALIEN PIGS, WEEDS, AN OTHER PESTS DEPLETE THESE FORESTS, THEY PUT OUR FUTURE WATER SUPPLIES INCREASINGLY AT RISK.

WHY ARE WE BEING INVADED? WHY IS HAWAI'I SO VULNERABLE?

HAWAI'I IS BEING OVERRUN BY ALIEN PESTS DUE TO FOUR MAJOR FACTORS

1 HUB OF THE PACIFIC

Hawai'i is the primary shipping link between the mainland U.S., Asia, and other Pacific Rim ports, handling nearly 19 million tons of cargo each year. Honolulu International is the 17th busiest airport in the world, averaging one arriving flight every 1.3 minutes. Hawai'i itself is reliant on these links; over 80% of the goods consumed in Hawai'i are imported.

Inevitably, cargo shipments, passenger flights, military transports, mail, and other traffic entering Hawai'i bring with them living plants, animals, and microbes that would have been unable to reach the islands on their own. During 1994, for example, state and federal inspectors intercepted alien insects and other invertebrates at our borders 2,275 times. Of these, 16% were found in ship cargo, 39% in air cargo, 40% in baggage from passenger flights, and 5% in mailed parcels and other miscellaneous pathways. About 48% originated in foreign countries, while 52% were sent to Hawai'i from the U.S. mainland. Many of these were invertebrates that already occur in Hawai'i, but at least 259 were species not known to occur here.

2 AN EXCEPTIONALLY VULNERABLE ENVIRONMENT

The same natural circumstances that have made Hawai'i such a paradise now make the islands exceptionally vulnerable to new pest species. For millions of years, Hawai'i was isolated from the rest of the world by 2,000 miles of open ocean. Plants and animals succeeded in crossing the ocean and colonizing Hawai'i very infrequently, perhaps as seldom as once in 50,000 years. Those that did survive this incredible journey found a pleasant climate, fertile soils, few competitors, and fewer diseases or predators.

The first Polynesian navigators to arrive in Hawai'i found an especially gentle and fertile land. Even today, the islands are free of most tropical diseases, dangerous predators, and nuisance pests. Many crops thrive here, free of the pests and diseases that limit their growth elsewhere.

As a result of this gentle environment, many native species lost their natural defenses because they had no need to escape or protect themselves from predators. For example, most native plants have no poisonous saps or thorns, and several birds lost their ability to fly.

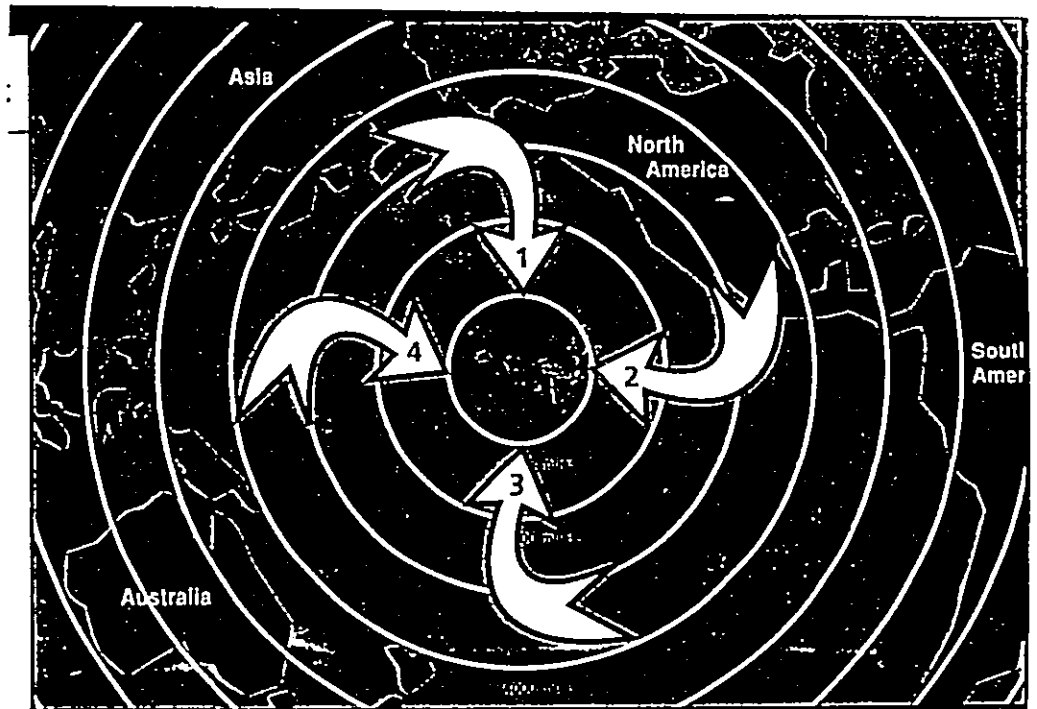
But now a new pest reaches Hawai'i once every 18 days on average. Like other species, they, too, benefit from Hawaii's lush environment. Free of the competitors and natural diseases that kept them in check in their own native environments, **these foreign pests sometimes explode in Hawai'i,** overwhelming native species, harming valuable crops, and sometimes threatening the islands' people as well.

3 LACK OF PUBLIC AWARENESS

Most pest introductions occur quite innocently. The majority of Hawaii's residents and visitors simply are not aware that foreign plants and animals pose a significant threat. They don't know how easy it is to accidentally bring in something via cargo, a box of fruit, or even on their hiking boots. Air passengers do not appreciate the importance of the airline agricultural declaration form. Most people do not know how to identify or report foreign species they may spot.

4 GAPS IN THE SYSTEM

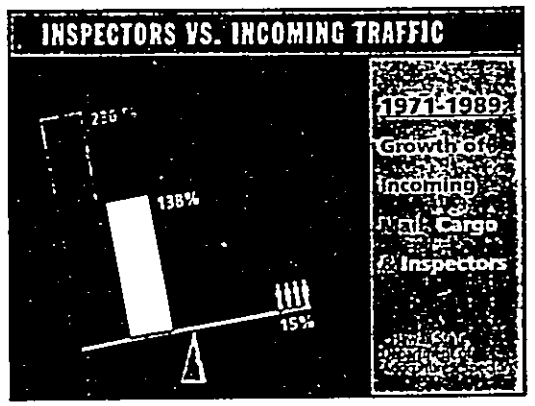
Over the past 100 years, agency programs have arisen as needed to address specific pest concerns (e.g., preventing rabies from entering the state, stopping pests of coffee, sugar, and other major crops, or controlling pest species on a particular nature reserve). The result is a set of programs that are generally effective within their own jurisdictions but which, taken together, leave many gaps and leaks for pest entry and establishment. In some cases, better pest prevention is a matter of more funds for inspectors and equipment; in others, jurisdictional gaps or conflicts must be overcome so that agencies can work better together to get the job done.



A DAY IN THE LIFE OF THE ALIEN PEST INVASION OF HAWAI'I

EACH DAY, PESTS HAVE MILLIONS OF OPPORTUNITIES TO REACH HAWAI'I

- **EVERY DAY BY AIR**
  68 Commercial Flights
  192 Interisland Flights
  21,992 Passengers
  11 Military Flights
  260,000 Pounds of Cargo
  15,575 Parcels
- **EVERY DAY BY SEA**
  30,964,000 Pounds of Cargo
  20,888 Parcels
  222 Passengers
- **EVERY DAY BY MAIL**
  614,000 Pounds of Mail
  1,171,384 Parcels



GAPS IN HAWAII'S PEST PREVENTION AND CONTROL SYSTEM

Many potentially damaging pests arrive in Hawai'i through the U.S. Mail.

In 1995, just 133 state and federal inspectors and 10 dogs were responsible for inspecting over 25,000 flights, 6 million tons of cargo, and nearly 8 million visitors and residents coming to Hawai'i.

Source: Hawai'i Department of Agriculture Planning and Development Branch

Hawai'i has been actively involved in alien pest prevention since 1888, when King David Kalakaua declared a quarantine on imported coffee to prevent the introduction of coffee rust and other diseases. Today, at least 20 state, federal, and private organizations and a number of volunteer groups dedicate a major part of their resources to design, implement, and improve alien pest prevention and control programs. This system relies on four lines of defense to protect Hawai'i from harmful pests.

FOUR LINES OF DEFENSE

Pre-Entry Prevention.....Port-of-Entry Prevention.....New Pest Control .....Long-Term Pest Control

Pre-entry defenses include international trade agreements which prohibit trade in harmful pests, and other mechanisms that prevent pests from leaving the foreign port en route to Hawai'i. Port-of-entry prevention is focused on inspections of arriving passengers and cargo to prevent pests from crossing Hawaii's borders.

The objective of new pest control is to prevent any pest that slips through our borders from spreading. Where this fails, long-term control is required to reduce the damages caused by pests that we will have to live with for many years. Currently, there are important gaps in each of these four lines of defense.

GAPS IN THE SYSTEM

1. International trade agreements and other federal programs do not protect Hawai'i from the full range of pests.

Many plants and animals which pose little threat in the temperate climates of the mainland U.S. are severe threats in Hawaii's tropical environment. For this reason, federal regulations currently provide inadequate protection against many of the pest species of concern to Hawai'i. Recent efforts to enhance international trade have raised further concerns, as Hawai'i laws are now being pre-empted by federal trade agreements to allow import of known pests despite formal objections from Hawaiian authorities. Hawaii's special vulnerability must be recognized by federal agencies, both to protect our islands and to reduce the risk of pests reaching the mainland after infesting Hawai'i.

2. A large proportion of the total passenger, cargo, and other traffic entering Hawai'i is currently uninspected, including materials known to be significant sources of new alien species.

Due to limited financial and personnel resources, and because the state tries to be as accommodating as possible to visitors, inspection agencies rely heavily on self-reporting and voluntary inspection; domestic (U.S.) flights and cargo, especially, are very lightly inspected. Even high-risk Guam flights—the most likely source of introduction for the brown tree snake—sometimes go uninspected due to staff shortages. Limited resources and the U.S. Postal Service's mandate to deliver the mail without delays greatly limit the inspection of Hawai'i-bound mail, in spite of evidence that the mail is a common pathway for live animals, insects, and weed seeds. Public awareness programs to encourage voluntary compliance are also inadequate.

3. Penalties for illegal introductions are inadequately enforced.

State and federal laws allow for significant fines and imprisonment penalties, but because the court system seems to be poorly informed about the seriousness of illegal importations, and because of an already busy court schedule, stiff penalties are rarely imposed.

4. The current process for determining which species are to be prohibited or controlled as pests is complex and cumbersome, and allows some known pests to be imported, sold, or spread to new areas.

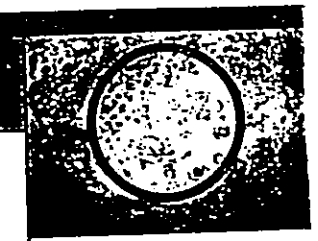
State and federal prohibited lists do not match, and import rules are different for animals vs. plants, making it more difficult for a potential importer to know clearly what is allowable. Many alien species do not prove to be pests until after they are imported. The lengthy requirements for adding a new species to the prohibited list prevents quick pest-control action, allowing new pest problems to spread while official review procedures are underway. Some known pests—like apple snails and Jackson's chameleons—can be kept and even sold if they were imported before the species was officially declared a pest, even while money is being spent elsewhere in the state to control the same species.

5. Response to new infestations is frequently delayed by jurisdictional or organizational problems, allowing pests to become established and, in some cases, to spread beyond control.

There is no reliable system for reporting most pests, and it is often unclear which agency has jurisdiction over a particular pest. Few contingency plans are in place to prepare for rapid control of pests that could potentially enter the state. The ranges of most of the serious, established pest species in Hawai'i have not been mapped; without this information, it becomes more difficult to plot strategies for pest control and track their effectiveness.

6. Interisland spread is a major, largely unregulated problem.

Few controls are in place to prevent the spread of serious pests from one island to another. Virtually all available inspection resources are taken up by inspection of overseas traffic. As a result, the damaging impacts of serious farm and forest pests are spreading throughout the state.



Quick containment versus long-term control: On Kaua'i, the first infestations of papaya ring-spot virus were eradicated for under $25,000. On the Big Island, where early eradication efforts failed, costs in crop losses and control programs have already exceeded $10 million.

Source: U.S. Department of Agriculture and Animal and Health Inspection Service

Estimated costs to homeowners to control termite damage has grown from $60 million in 1986 to $150 million in 1995.

Source: College of Tropical Agriculture and Human Resources, University of Hawai'i Department of Entomology

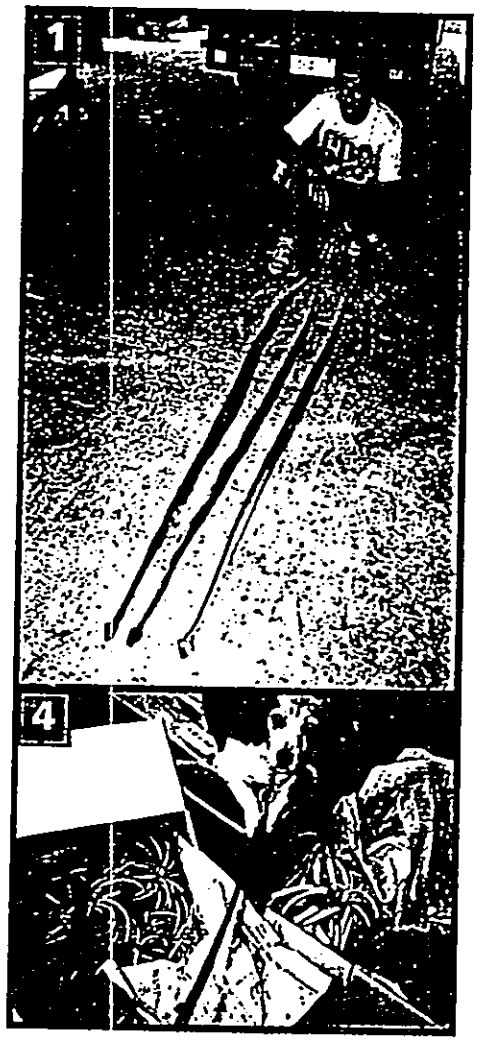
...ACTION NOW

WHAT CAN WE DO???

In 1995, 14 state, federal, and private organizations came together to form the Coordinating Group on Alien Pest Species (CGAPS). Formation of this unprecedented partnership is the first step in an Alien Species Action Plan designed to close gaps in the pest prevention system. Senators Akaka and Inouye and Governor Cayetano, especially, have recognized the alien pest invasion as a social issue of the highest priority. Implementation of the other elements of this plan—outlined below—is now under way. Success, however, depends heavily on support from elected officials and the general public for these critical improvements.

For some of the following actions, programs are in place but need further funding, added expertise, or better coordination. For others on the list, new and innovative programs need to be initiated. All of these actions will require political and community support of the highest order.

Further delay will only increase the costs associated with containment and damage and will increase the risks to Hawaii's economy, natural resources, and the health and lifestyle of its people.



...BEFORE IT'S TOO LATE...

THE TEN POINT ACTION PLAN

1 STOP THE BROWN TREE SNAKE

The brown tree snake is the most frightening and dangerous pest currently threatening Hawai'i. It must be stopped at the border, for if it succeeds in entering the state and establishing a breeding population, there is no known means of eradicating it. State and federal agencies need additional funding and manpower to a) inspect all aircraft and ships leaving Guam to be sure they are snake-free, b) inspect again on their arrival in Hawai'i, c) conduct ongoing surveys near harbors and airports to detect any snakes that succeed in entering Hawai'i as early as possible, and d) train and maintain Snake Watch Attack Teams on each island to be ready to respond in the event snakes are found in the islands. Additional research is needed to develop more effective snake control methods.

2 DRAMATICALLY INCREASE PUBLIC AWARENESS OF ALIEN PEST PROBLEM

More than any other factor, improved pest prevention depends on greater involvement by individual travelers and residents in Hawai'i. An ongoing campaign (beginning with this report) is needed to heighten general public awareness of pests to watch out for, how to report them to authorities, and how to avoid accidentally introducing them to the islands. People within the transportation and public safety industries must receive special training in detecting, handling, and reporting pests, and a reliable system for responding to pest reports must be established. Professional assistance from the communications industry is needed to make this campaign as powerful as possible.

3 PREVENT PEST INTRODUCTIONS BY THE MAIL

Experienced inspectors believe that the mail may account for as much as 20% of the pests reaching Hawai'i each year, some mailed innocently out of ignorance and others mailed in an attempt to evade the law. Until the mail is actually inspected, we cannot know the full extent of the pest threat. While federal agents inspect Hawaii's mail bound for California under a special program, mainland mail is not inspected before being delivered in Hawai'i. State and federal inspectors need trained dogs, equipment, and statutory authority to enable inspection of suspicious parcels in First Class and private carrier mail bound for Hawai'i without slowing the overall mail delivery. The existing U.S. Customs Service and U.S. Department of Agriculture programs that inspect foreign mail need stable and adequate funding.

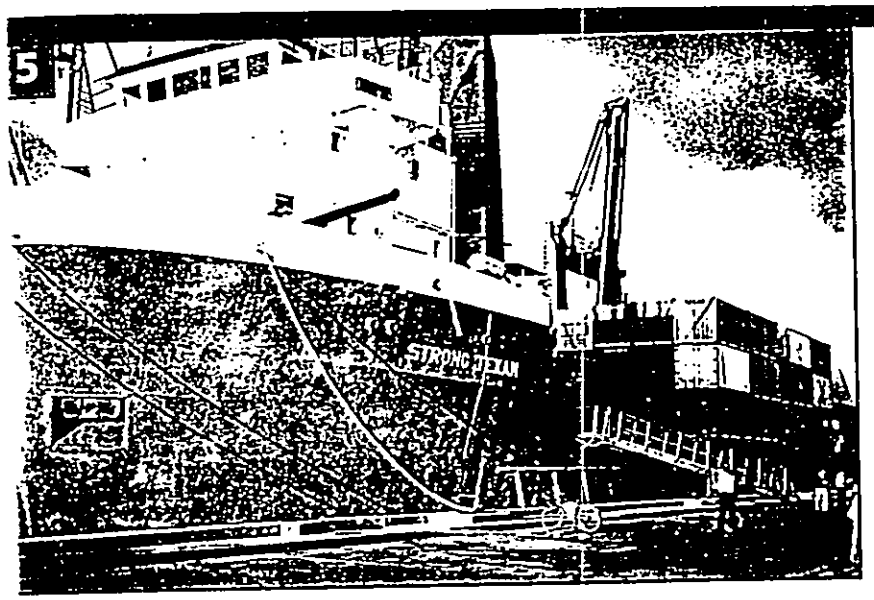
4 PREVENT PEST INTRODUCTIONS VIA AIRCRAFT

In 1994, nearly 80% of the alien species intercepted at Hawaii's borders arrived via aircraft—as cargo or in passenger baggage, or as hitchhikers in the aircraft itself. Aircraft are an especially easy means of travel for brown tree snakes and disease-bearing insects like mosquitoes. The challenge is to inspect flights and passengers more thoroughly without ruining the Hawai'i visitor experience or clogging traffic at airports. Full participation by the airlines and travel industry is needed to inform visitors before they leave home and during their flight of the prohibitions against bringing plants, animals, or soil to the islands, and the stiff penalties for violations. State and federal agriculture inspectors need additional staff and equipment to efficiently inspect all arriving commercial, military, and private flights and baggage without inconveniencing travelers.

5 PREVENT PEST INTRODUCTIONS VIA SHIPPED CARGO

Ships and shipped cargo accounted for about 15% of the alien species intercepted in 1994. Much of the shipped cargo entering the state is not inspected, however, because of staff shortages and the sheer volume of traffic. To address this gap, inspectors need access to improved technologies for identifying high-risk cargo. By working closely with shippers and harbor personnel, inspectors can then intercept pests without unnecessarily detaining low-risk shipments.

THE TEN POINT ACTION PLAN ...TO ARREST THE INVASION OF ALIEN PESTS



6 DEVELOP MORE EFFECTIVE SYSTEMS TO DETECT, CONTAIN AND ERADICATE NEW PEST INFESTATIONS BEFORE THEY BECOME WIDESPREAD.

When a new disease, a noxious weed, or other pest does slip past inspectors, it becomes critically important to detect and eradicate it quickly before it spreads beyond control. To succeed, the biologists doing this work need a) strong technical support to quickly determine whether a detected species is a threat, and b) the immediate funding, trained personnel, and equipment to carry out the eradication and ensure that it was effective. Too often, one or both of these is lacking, and the result is millions of dollars in costs for long-term treatment as the pest becomes widespread, without any hope of complete eradication. Needed improvements include a user-friendly public hotline and education program to encourage reporting of top-priority pests; increased surveillance of airports, harbors, farms, and other high-risk sites to detect pests before they cause a serious problem; and a mapping system to track pests of greatest concern. Some of this work is already under way, but most remains to be done.

7 STOP THE INTERISLAND SPREAD OF KNOWN PESTS.

A number of major farm, forest, and health pests are currently restricted to one or a few islands in the state; preventing their spread to uninfested islands is a top priority. Because these pests—like banana poka, brucellosis, and papaya ring-spot virus—are already well-known for their destructive abilities in Hawai'i, we can be sure that they will cause major additional harm if allowed to spread to more islands. They can be stopped through heightened public awareness and improved containment efforts when new infestations are discovered (numbers 2 and 6 above). In addition, interisland inspectors are needed to ensure that passengers are not accidentally or purposefully carrying dangerous pests.

8 ENSURE STIFF PENALTIES FOR DELIBERATE PEST INTRODUCTION

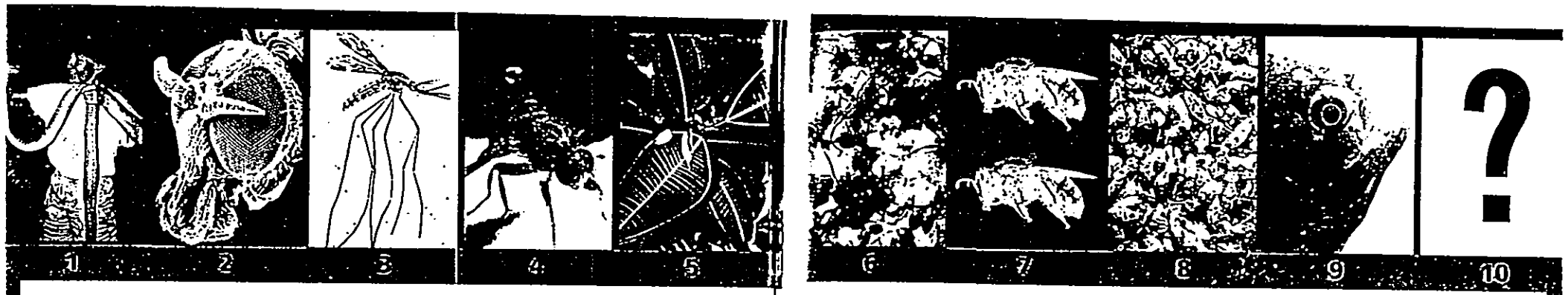
Too often, violators of pest prevention laws receive mild penalties or none at all, and the general public is left to pay the full costs of damage to the environment and economy. The U.S. Department of Justice has been tasked with identifying steps to strengthen enforcement of federal laws under a directive authored by Hawaii's Congressional delegates, and there is work under way nationwide to develop stronger protections against this biological pollution. In addition, the Hawai'i judiciary must send a strong message that violations of quarantine laws are taken seriously.

9 CLARIFY WHICH SPECIES ARE PROHIBITED AND SIMPLIFY PERMIT REVIEW SYSTEMS

Ideally, every new species in Hawai'i would be "by invitation only" to ensure we only receive desirable plants and animals. Permits are currently required for importation of many organisms, but the system is confusing and time-consuming. Federal and state lists of prohibited species don't match, for example, and many plants can be imported without any review of their potential to become weedy pests. Research is needed to improve our ability to quickly assess the pest potential of imported species. The permit process must be streamlined to minimize confusion, unnecessary delays, and paperwork.

10 ENSURE FEDERAL SUPPORT OF HAWAII'S PEST PREVENTION SYSTEMS

Additional federal assistance is needed, both to protect our islands and to reduce the risk of pests reaching the mainland after infesting Hawai'i. To achieve this, Hawai'i must receive the same kind of federal attention that California has received in its program to stop fruit fly invasions from Hawai'i and foreign sources. A comprehensive package is needed to bring state and federal programs into harmony and maximize the use of available resources to stop pest invasion.



THE 10 MOST UNWANTED

1. Brown tree snake *(Boiga irregularis)*

- Up to 10 feet in length, greenish-brown and scaly, with bulging eyes;
- Responsible for weekly power outages and more than 2C skehite cases on Guam;
- Found in Hawai'i on six occasions, on or associated with aircraft from Guam;
- Chances of becoming established in Hawai'i: HIGH, unless prevention measures are dramatically improved.

2. Biting sand flies and midges (*Lycoconops, Simulium,* and other genera)

- Can inflict 1,000 to 10,000 bites per human per day if skin is fully exposed;
- Have had detrimental effect on visitor resorts in Tahiti, Caribbean and the Marquesas;
- Breed in beach sand or streams in many areas of the world;
- Almost arrived in Hawai'i via open-hulled canoes in 1995;
- No eradication effort has been fully successful;
- Most likely pathway to Hawai'i: uninspected private yachts or planes carrying illegal soil and plant material in which these flies breed.

3. Malaria-carrying mosquitoes (*Anopheles* species)

- No malaria-carrying mosquito is yet established in Hawai'i;
- Transmit malaria to humans and could increase the disease threat to our remaining native birds;
- Spread much more rapidly than most mosquitoes, making eradication unlikely;
- If established, residents and visitors to Hawai'i would require malaria shots or pills;
- Control of new malaria outbreak in Hawai'i could be extremely difficult.

4. Queensland fruit fly *(Bactrocera tyroni)*

- Breeds in wide variety of crops, limiting their export to major markets;
- Would greatly hinder Hawaii's efforts to diversify its agriculture industry;
- Most likely pathway to Hawai'i via fruits or vegetables from Australia.

5. Miconia—The "Green Cancer" *(Miconia calvescens)*

- A Latin American tree that has spread from garden plantings into watershed forests where it casts a dense shade, killing other plants;
- Has invaded 70% of Tahiti's native rain forest;
- Now found on the Big Island, Maui, Kaua'i and O'ahu, where containment projects are underway. Must be kept off of Moloka'i and Lana'i.

6. Fire ant *(Solenopsis invicta)*

- Sent more than 20,000 people in the southern U.S. to doctors and resulted in 32 deaths in 1989, due to allergic reactions to the ants' toxic stings;
- Devastates native and beneficial farm insects, and damages seeds, flowers, fruit of many crops;
- Capable of killing ground-nesting birds, small animals, and may kill trees by girdling their trunks;
- Attracted to electrical equipment and well manicured turf grasses (such as golf courses), and destructive to drip irrigation systems;
- Intercepted at Honolulu post office in package from Florida in 1991.
- Risk of further introductions by mail or cargo: HIGH.

7. Africanized honey bee or "killer bee" *(Apies mellifera scutellata)*

- Very aggressive honeybees responsible for 1,000 human deaths and perhaps 200,000 attacks requiring medical treatment;
- Poses major threat to human safety, especially for native Hawaiians and others with high sensitivity to bee stings;
- Spreading rapidly into the southern U.S., and capable of reaching Hawai'i as stowaways aboard ships;
- Reached southern California in 1995, increasing the risk of invasion to Hawai'i.

8. Any new termite (any of 2,000 species)

- Small wood-and plant-eating insects that already cause $150 million in treatment and repair costs annually in Hawai'i, yet we have only four of the world's 2,000 termite species;
- Especially destructive species are now active in Guam, Arizona, northern Japan, and other areas that send people and cargo to Hawai'i daily;

9. Piranha *(Serrasalmus species)*

- Often attacks and inflicts dangerous wounds to humans and large animals;
- Thirty-nine piranhas confiscated in Hawai'i in 1992 including two found in O'ahu waterways; all apparently mail-ordered from "dangerous pets" dealer on U.S. mainland, and shipped to Hawai'i through uninspected First Class mail;
- Same dealer sold scorpions, tarantulas and other species to Hawai'i customers.
- Chance of reaching Hawai'i: HIGH.

10. What's next?

- The most worrisome alien pests are those we may not even know about yet. In many cases, it is not possible to predict which foreign species will become pests if they reach Hawai'i.
- Many of our worst pests were introduced with good intentions but turned out to be terrible problems. Others—especially insects and diseases—hitchhiked aboard other harmless species.
- The only cost-effective approach is to choose very carefully those species we want here, and to strengthen prevention systems to stop unwanted introductions.

STOP THEM

THE AIR. STOP THEM IN THEIR TRACKS.

WHAT YOU CAN DO TO HELP PROTECT HAWAI'I FROM ALIEN PESTS

1 **Watch out for foreign plants and animals.** Report sightings of animals that don't belong in Hawai'i, such as snakes, alligators, parrots, or other exotic birds or animals which are unfamiliar to you. **Learn to identify Miconia, banana poka, and other major plant pests.** Call the state Depart[illegible] 8-0844 or 586-F[illegible] to report them.

CALL ASK-2000 (275-2000)

2 **Keep your pets (cats, dogs, rabbits, parrots, reptiles, fish) at home.** It is illegal to release any non-native animal without a proper permit. Rabbits released into the wild destroy crops and native vegetation; cats prey on native birds; and aquarium fish, if released into streams, compete with and prey on native fish and shrimp. Escaped or *liberated* exotic birds carry disease, damage fruit and flower farms, and compete with endangered native birds. Bring any unwanted pets to the Humane Society. If you or a friend have an illegal animal as a pet, turn it in voluntarily to the [illegible]ent of Agricul[illegible] just call 586-PE[illegible] the right thing.

CALL ASK-2000 (275-2000)

3 **Fill out your Department of Agriculture declaration form completely and honestly.** The declaration form the flight attendant gives you is your opportunity to report anything you may have brought with you that could be a problem. Remember, just because you list the item doesn't mean it will be taken away from you. If necessary, it will be inspected and, if it poses a pest threat, it will be dealt with appropriately. You are not subject to a penalty if you voluntarily submit these items for inspection. If you try to avoid inspection, the options are 1) a $100-$25,000 fine and/or one year in jail (depending on the violation) if you are caught, or 2) being the person responsible for introducing a new disease or other pest to Hawai'i.

4 **When coming to Hawai'i, don't bring plants, fruits, vegetables, or illegal animals with you.** Fruits, vegetables, pets, and even muddy shoes are great *hitchhiking* vehicles for diseases, insects, and weed seeds, which can easily escape and establish themselves as new pests. Clean boots and camping gear before returning home to Hawai'i. Insects can also hitch a ride to Hawai'i on illegally imported animals, such as snakes, or on cats and dogs smuggled to avoid quarantine.

5 **Mail-order wisely and ask friends and relatives not to send you plants or animals through the mail.** Many catalogs offer plants and animals that become serious pests in Hawai'i. Even the desirable plant, fruit, or animal sent through the mail may have other pests growing on it. To avoid problems, check with the state Department of Agriculture to be sure a particular catalog item is allowable in Hawai'i. Obtain the state import permit required for all animals and microorganisms and many plants. Be sure parcels mailed to you are clearly marked *Contains Living Material: Please Open for Agricultural Inspection* to avoid any delays in delivery.

6 **Landscape with native plants or non-pest ornamentals.** There are many beautiful plants that are tempting to use in landscaping or to sell in garden or flower shops that are terrible pests once they escape into the wild. Seeds and spores from non-native plants in your garden can easily spread and establish themselves in our native forests or farms. By growing native plants, such as 'ilima, 'a'ali'i, and wiliwili, you can help preserve native species and Hawaiian culture. For dry areas, native plants also offer less *thirsty* landscapes, helping conserve our precious fresh water supply.

7 **Clean your hiking boots, running shoes, and other gear before you enter native forest areas or travel interisland.** Many alien weeds are carried from one island to the next on muddy boots, camping gear, or farm equipment. The simple precaution of scrubbing your gear can keep some of our worst pests from spreading to other islands or into the heart of our remaining pristine forests.

8 **Don't spread crop pests by sharing diseased plants.** Banana bunchy-top disease, papaya ring-spot virus, and taro root aphid are all devastating pests that are spread by people giving diseased plants to their friends. An act of generosity could be a deadly blow to your friend's garden or farm, and to the farmers of an entire island. Ask the Hawai'i Department of Agriculture before sending or carrying plants interisland.

9 **If you sail or fly, keep a clean ship.** Don't be tempted to bring potted plants, animals, or other living material to Hawai'i on your sailboat or private plane. As the crews of the Polynesian voyaging canoes discovered in 1995, these can carry the larvae of biting flies or other serious pests. And remember that sand, soil, and plant products like wood carvings or mats can be full of pests. Ballast water, also, can carry foreign algae, jellyfish, mollusks and other potentially harmful species to Hawai'i. Keep a clean craft, and show everything you do bring to Hawai'i to the Customs and Agriculture inspectors.

10 Spread the word. Share this information with a friend. Protecting Hawai'i from pest invasion depends on what you and other individuals do. Encourage your friends and family to do the right thing.

STOP THE ALIEN INVASION

START RIGHT NOW.
Please copy this list and pass it on to family, friends, and co-workers.

1. Learn to identify the most threatening pests and report them.
2. Don't release your pets into the wild.
3. Fill out your Department of Agriculture declaration form completely and honestly.
4. When coming to Hawai'i, don't bring plants, fruits, vegetables, or illegal animals with you.
5. Mail-order wisely and ask friends and relatives not to send you plants or animals through the mail.
6. Landscape with native plants or non-pest ornamentals.
7. Clean your hiking boots, running shoes, and other gear before you enter native forest areas or travel interisland.
8. Don't spread crop pests by sharing diseased plants.
9. If you sail or fly, keep a clean ship.
10. SPREAD THE WORD. Share this information with a friend.

DO THE RIGHT THING!
Report sightings of animals, plants, and insects that don't belong in Hawai'i.
CALL: ASK-2000 HOTLINE (275-2000)

THE COORDINATING GROUP ON

CGAPS MEMBERS: Hawai'i Department of Agriculture • Hawai'i Department of Health • Hawai'i

ALIEN PEST SPECIES (**CGAPS**) IS A

Department of Land and Natural Resources • Hawai'i Department of Transportation • Hawai'i

MULTI-AGENCY PARTNERSHIP TO

Farm Bureau Federation • Hawai'i Visitors Bureau • National Park Service • The Nature Conservancy

COORDINATE MORE EFFECTIVE PRO-

of Hawai'i • U.S. Customs Service • U.S. Department of Agriculture • U.S. Fish and Wildlife Service •

TECTION FOR HAWAII'S ECONOMY,

U.S. Navy • U.S. Postal Inspection Service • U.S. Postal Service • Acknowledgements: CGAPS

ENVIRONMENT, HEALTH, AND WAY OF

thanks the many individuals in Hawai'i and elsewhere who contributed to this report.

LIFE FROM HARMFUL ALIEN PESTS.

Cover photo, Marc Schechter • Cover illustration, Harold Vante • Pages 1-2, tarantula, Marc Schechter • Pages 3-4: piranha, Marc Schechter; mosquito, W. Donwood/Visuals Unlimited • Pages 5-6: snake, Tom Fritz [illegible] USDA; scorpion, Marc Schechter • Pages 7-[illegible] file photo, wind flies, Visuals Unlimited, cobra fish, HDOA; killer bees, USDA; mosquito, A. M. Singleman; piranha, Marc Schechter • [illegible] HDOA • Pages 11-12 [illegible] fruit fly, Ken [illegible] 12-14 [illegible] cane, Jack Jeffrey; silversword, Kevin Doyle; banana poka, Sheila Conant; feral pig, Jack Jeffrey • Pages 15-16, mail box, Hub Frum; dog inspection, HDOA; papaya ringspot virus, Stephen Ferreira/UH; termites, Kenneth Grace/UH • Pages 17-18: snakes laid out on ground, Fort Campbell, dog inspector, HDOA • Pages 19-20: ship inspection, HDOA, plant inspection, HDOA; U.S. Capitol, architect of the Capitol • Pages 21-22 [illegible] Gordon Rodda; sand fly, Douglas [illegible] mosquito, John Cunningham/Visuals Unlimited, fruit fly, Ken [illegible] USDA; fire ant, USDA; [illegible] DAR

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REPORT AND RECOMMENDATIONS ON THE PROPOSED EXTENSION OF THE KALULUI AIRPORT RUNWAY

RICHARD L. LIPSEY, PhD
LIPSEY AND ASSOCIATES, INC.
MAY 21, 1996

EXHIBIT "A-ii"

REPORT AND RECOMMENDATIONS ON THE

PROPOSED EXTENSION OF THE KALULUI AIRPORT RUNWAY

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EXTENSION OF KALULUI AIRPORT RUNWAY

1. General Background - Maui

Although the population of Maui declined between the 1840's and the 1960's, the tourist industry boom began in the 1970's and has continued to date. Of all the islands, Maui has the highest percentage of white population, being 41% white (91,361 people) as compared to the Hawaii's 33% The remaining resident population of Maui is 19% Filipino, 18% Japanese, and 14% Hawaiian and the rest a miscellany of minorities. Because of the ratio of homes to residents and the average income of $48,365.00, Maui is a relatively affluent island.

In 1992, Maui had 2,285,000 visitors who spent $2.2 billion dollars on the island. Tourism in fact supports 45% of Maui's population. A Honolulu newspaper article on March 28, 1996 noted that 1/3 of all tourism jobs and 24% of all tourism income in Hawaii was located in Maui. The article concluded at any one time, 40% of the population on the island were visitors.

Estimates of growth in passenger arrivals and departures from Maui at the Airport without the addition of the Extension (no international arrivals\departures) compares the 1992 level of 1,281,797 with an estimated 1,557,000 in the year 2000. With the Extension, arrivals and departures in 2010 are anticipated to be 2,041,000 of which 511,000 will be international. The international component in 2010 is therefore estimated to be approximately 25% of total arrivals and departures.

Although tourism has been a continuing growth industry for Maui, hotel construction has been cyclical and is currently in a slump. The largest number of building permits for hotel construction in recent years were issued in 1988, with no building permits being issued in 1992 and 1993.

Notwithstanding the importance of tourism to the island, agriculture has and continues to be important to the island's economy. Currently 350,000 acres are under cultivation producing an annual crop yield valued at $140 million dollars despite a recent decline in sugar and pineapple production. The principal crops are sugar (42%), pineapple (42%), vegetables (10%), and flowers (6%). Livestock adds $11.7 million to the total value of agriculturally related products. By comparison, it is estimated that the airport generates $325 million dollars of economic benefit to the island.

2. Kalului Airport Environs

Adjacent to the 1,447 acre Kahului Airport is Kanaha Pond, a 230 acre wetland under the control of the Department of Land and Natural Resources. Kanaha Pond is classified as a State Wildlife Sanctuary and was designated as a National Natural Landmark in 1973.

Annual rainfall ranges from 15 to 90 inches a year; the rainy season being from November to April. There are seven types of soils in the vicinity. The soil is well drained.

3. History of Airport Expansion Proposal

The Kahului Airport ("Airport") was from 1942-1947 a United States Naval Air Station which was given to the State of Hawaii in

1947. It has two runways, Runway 5-23 which is 4900 feet long and Runway 2-20 which is 7,000 feet long. They are 12 to 54 feet above sea level.

The Airport is not now able to service trans-Pacific flights due to the fact that neither of its runways meet federal safety standards for planes of the size and weights - the clearest deficiency is the shortness of both runways. Both a loaded DC-10 (weighing approximately 430,000 pounds) and a loaded L-1011 (weighing approximately 360,000 pounds) are required to land in Honolulu.

The requirement that the DC-10 and L-1011 as well as other planes of a similar size and weight ("jumbos") land in Honolulu adds hours to intercontinental flights and clutters Honolulu airport with transit traffic. Even with its restricted landing capability, the Airport is second only to Honolulu in the islands in air traffic.

4. The Airport Expansion Proposal

Thus the genesis of the proposal to extend Runway 2-20 by 2600 feet to 9600 feet (the "Extension") so that it will be suitable for the landing of transcontinental aircraft with passengers, cargo and fuel sufficient to reach Chicago and Dallas to the east and the airports of the Pacific to the west. The plan includes a proposal to acquire 540 acres of sugarcane from A & B Hawaii, a Maui landowner, such that the extended runway would have adequate surrounding acreage for safety.

The need for the Extension reflects an intent to improve

airport safety as well as a desire to provide direct air connections to the Pacific and the Mainland. The Extension will not only expand the capability of the Airport to offer such service but will increase the safety of air traffic now being offered. In addition, because flights leave Maui fully loaded for transit to non-Hawaii destinations, the necessity of landing and taking off from the crowded Honolulu air space in and of itself presents a safety risk simply by further cluttering Honolulu air space. Such inter-island transit flights also adds to flight expenses as well as inconveniencing passengers whose final destination after already long flights is Maui. Clearly, the most important advantage of extending the runway is safety, followed by reduced emissions and time in already congested Honolulu.

The Extension will extend, widen and increase the depth of Runway 2-20, and will add the extensive lighting and air traffic facilities required for an airport servicing heavy loaded international aircraft. It has been reported that because of the shortness of the runway, jets on several occasions have barely stopped in time at the end of the Runway 2-20 during wet conditions. The improved runway conditions and enhanced facilities will improve operation in bad weather.

Various studies and reports have been completed reviewing the necessity and feasibility of extending the runway, as well as the anticipated impact of the Extension, on the environment, economy, and demographics of Maui. It is reported that the Kona Airport was

extended two years ago without any significant environmental impacts and the airport at Hilo was extended 20 years ago without significant environmental impacts. It is recognized that Maui and the big island are different in many respects, especially in diversity of habitats and the number of endangered species, but agriculture is important on both islands, but may be more important in the big island.

5. History of Proposal Review Process

The 1989 proposed Kahului Airport Development Plan was challenged in litigation by various Maui community and service environmental groups with the result that an agreement was entered into for an environmental assessment of the proposed plan. In 1991, the State of Hawaii agreed to prepare an Environmental Impact Statement utilizing the criteria established by the National Environmental Policy Act, the Hawaii Environmental Policy Act and the Council on Environmental Quality. In 1993 the Kahului Airport Master Plan to extend runway 2-20 to 9,600 feet was completed by the Hawaii Department of Transportation.

The Environmental Impact Statement was prepared utilizing the above described criteria and after receiving input from several federal agencies (including the Federal Aviation Administration and the Department of Transportation), 16 state agencies, 9 Maui community agencies, 10 state legislators, and 150 private groups; however, the Hawaii National Park administration was not accepted and did not participate as a cooperating agency since the United States Fish and Wildlife Service was designated as the cooperating

agency having jurisdiction over endangered species concerns.

The EIS also considered the applicability of a myriad of federal, state and county statutes, rules, regulations and ordinances such as the National Environmental Policy Act, Clean Water Act, the Coastal Zone Management Act, the Coastal Barriers Resources Act, the Department of Transportation Act, the Hawaii Revised Statutes, and the National Historic Preservation Act of 1966.

6. The Environmental Impact Statement ("EIS") Draft, Vol. 1, March, 1996 regarding Kahului Airport Improvement

In general, the EIS found that the Master Plan was in compliance with the criteria of the National Environmental Policy Act ("NEPA") and those of the Council of Environmental Quality regarding the anticipated direct impact of the Extension on the environment and the indirect demographic impact from the projected increase in tourism. The lead agency in the review process was the U. S. Department of Transportation as represented by its Honolulu office.

The EIS summary condenses the abstracts attached to the report by concluding that the Extension will have no effect on the fauna, flora, wetlands, or on marine species. The summary also concludes that:

1. The increase in noise will be insignificant;
2. The air quality will actually be significantly improved;
3. Impact on water quality will be insignificant;
4. The geographic and physiological impact on the environs

will be insignificant;

5. However, the impact on the historical and archeological aspects of Maui could be significant so data should be recorded as needed.

The bases for the conclusions stated in the summary are contained in the abstracts. Key information from the abstracts on each summary conclusion is stated below.

A. Biotic Communities - Flora Wetlands are the most important of the six vegetation zones. The Kahului Airport area does not contain any endangered or threatened plant species, but does contain 166 plant species of which 11% are native species. The proposed expansion will impact 170 acres of grassland, 140 acres of sugarcane/ruderal border and 30 acres of Koa Haole/mixed understory but no protected species. The proposed extension will result in insignificant effects to the vegetation in the airport area.

B. Biotic Communities - Fauna. The Kanaha Pond Wildlife Sanctuary is on airport property, but is about a mile from Runway 2-20. Three endangered birds are found there: the Hawaiian Stilt, the Hawaiian Coot and the Hawaiian Duck. A total of 14 introduced bird species have been sighted at the pond with the Rock Dove being the most common. There has been significant decline in bird numbers since 1980. This is true all over the United States. In Florida, there has been a 90% reduction in wading birds since 1956 from draining, building, mercury poisoning and so forth (University of Florida, 1996). Stilt carcasses have been found on the airfield

and attempts to drain the low areas of the airfield where they feed should be done or the low ares filled-in to make the areas less attractive to the Stilts. HDOT has suggested grading the entire airfield area to minimize ponding. HDOT has recently provided additional land area to Kanaha Pond Wildlife Sanctuary to be developed for stilt feeding areas. The Hawaiian Hoary Bat, which has been seen at Haleakala National Park, has not been seen in the airport area.

C. Key Information on Impact of Construction and Flights

Airport construction could take up to 2 months and result in aircraft using runway 5-23 causing the aircraft to fly over the pond which could disturb Hawaiian coots and Hawaiian stilts. However, the proposed runway extension is not expected to have a significant effect on the fauna in such areas as loss of habitat, effects on endangered or threatened species, night flight disturbances or an increased rate of alien species introduction.

Adding 2,600 feet of runway will allow fully loaded jumbo jets to land in Maui instead of stopping in Honolulu, but the jets are expected to be from Dallas, Denver, Chicago, etc. and Japan where the risk of increasing the rate of alien species introduction is not expected. Jumbo jets from tropical countries, especially third world countries is another matter.

The marine environment could be impacted by the proposed runway extension by a potential impact on water quality. HDOT is planning on building erosion and retention ponds to prevent large influxes of sediment. The green sea turtle is the only known

endangered species seen in these waters, but coral can be adversely affected by excess sediment.

D. Key Information on Emissions Emissions are defined by and acceptance of emissions levels are determined by approved Ambient Air Quality Standards ("AAQS"). The AAQS establishes maximum allowable concentrations for aircraft emissions for particulates, sulfur dioxide (SO2), oxides of nitrogen (NOx), and carbon monoxide (CO). The national and state standards for aircraft for particulates and sulfur dioxide are the same at 150 tons and 80 ug\m3 respectively. However, the national and state maximums for nitrogen dioxide (NO2) emissions are 100 ug\m3 and 70 ug\m3 respectively. The national and state maximums for carbon monoxide emissions by aircraft per eight hours are 10,000 ug\m3 and 5,000 ug\m3 respectively. At present, all aircraft emission levels are below AAQS maximum emission standards.

In order to evaluate the impact of emissions from airport operations in the event the Extension is completed and anticipated additional international flights arrive, it is necessary to compare the level of anticipated aircraft emissions to the AAQS maximum levels established for aircraft operations as well as to total Maui emissions from all sources.

For example, while the anticipated level of total aircraft emissions is 3 tons of particulates per year, total particulate emissions per year from all sources on Maui are 6,636 tons. The major sources of particulates are power plants (480 tons), agricultural fuel combustion (2,925) and 600 from industry

(minerals). Thus, particulate emissions from aircraft are anticipated to be 1/500th of all particulate emissions on Maui.

A similar comparison can be made for other measured emissions. Aircraft emissions of sulfur dioxide is anticipated to be 18 tons in comparison to a Maui total of 6,382 tons per year; aircraft emissions of oxides of nitrogen is anticipated to be 359 tons in comparison to a Maui total of 9,264 tons per year; and lastly, aircraft emissions of carbon monoxide is anticipated to be 1,090 tons in comparison to a Maui total of 64,057 tons per year. In all cases, aircraft emissions represent and are anticipated to represent a fraction of total emissions from all sources on Maui.

More importantly, it is anticipated that the increased aircraft operations permitted by the Extension will result in a violation of only one of the four emission standards. Carbon monoxide standards will be exceeded for one and eight hours since aircraft permitted emissions are 10,000 tons and 5000 tons per 8 hour period for federal and Hawaiian MAC's (Maximum Allowable Concentrations). The Federal Air Standard is 10,000 tons/ 8 hours. However, carbon monoxide emissions can be reduced by taking steps to reduce the burning of sugar cane; reduce idling and cars curbside; reduce aircraft taxi times; and utilization of more efficient engines on some aircraft.

E. Key Information on Water Quality A catch basin is recommended with an oil/water separator to handle petroleum run-off from the airport, and this run-off water from access roads, parking lots, taxiways and runways should be channelled away from Kanaha

Pond unless it can be treated with a tertiary treatment process. Fuel storage facilities should be placed as far away from Kanaha Pond as is reasonably possible. An adequate retainer wall should be built around the fuel storage tanks to contain any leaks or spills should they occur in order to protect Kanaha Pond and the three endangered species that are found there.

F. Key information on Archeological or Historical Sites. It is anticipated that the Extension will have no impact on archeological or historic sites; however, to the extent that any impact is discovered during construction, data recovery and other standard archeological research techniques should be utilized as needed.

G. Key Information on Socio-Economic Impact Travel experts estimate that the immediate result of the Extension will be to expedite movement of tourists and that there will be very little additional tourist flow and suggest that special promotions could be used to bring jumbo jets from the Mid-West during slump periods. However, an annual increase of 3 to 4 percent growth in tourism is expected. Note the estimate that 25% of arrivals and departures will be from international flights by the year 2010.

7. Alien (Non-Indigenous) Species Studies and Recommendations

The Nature Conservancy of Hawaii, and the Natural Resources Defense Council in July, 1992, produced an excellent report (Exhibit 1) entitled a Background Study and Recommendations for Interagency Planning regarding the issue of Alien Pest Species Invasion in Hawaii (hereinafter referred to as the "NC/NRDC STUDY"

and attached hereto as Exhibit 1). In addition, The Office of Technology Assessment of the United States Congress has published an excellent chapter in Harmful Non-Indigenous Species in the United States entitled "Two Case Studies: Non-Indigenous Species in Hawaii and Florida" (hereinafter referred to as the "NIS Case Study" and attached hereto as Exhibit 2). Key information from both studies is described below.

A. Sources of Introductions of Alien Species. Twenty new invertebrate species per year have been introduced in Hawaii since 1970 with 50% becoming economic pests and 1 out of 20 introduced species becoming a serious economic pest, ie the lesser corn stalk borer in sugarcane costing $9 million since the introduction in 1986. Probably 5 new weed species are introduced/year. Inspectors estimate that most pests enter Hawaii via airline passenger flights, first class mail and cargo. Pests enter in descending numbers from the mainland, Southeast Asia, tropical American and the southwest Pacific.

In 1994 alone, USDA, APHIS and HDOA intercepted 131 alien insects and 183 illegal animals including ferrets, snakes, frogs, crabs, piranhas and lizards. New residents from foreign contrives often bring local fruits and vegetables into the state and try to transplant them. In 1994, 19 alien pests escaped and 3-4 will need controlling.

B. Control concerns.

1. A proportion of uninspected passengers and cargo.
2. Inadequate sampling strategies.

3. Inadequate penalties for illegal introductions
4. Federal quarantine programs not focused on Hawaii's special vulnerability to foreign pests.
5. Inadequate process to determine prohibited species.
6. Response to new infestations delayed by jurisdictional or organizational problems.
7. Inter-island spread of pests an unregulated problem.
8. Available control techniques not fully utilized.
9. Certain alien species maintained for various social values - ie. sport hunting, crops, aesthetics.
10. Inspection and control efforts not using the latest technology ie tomography, fruit and vegetable x-ray and color x-ray tomography.

C. Inspections. Customs in recent years has shifted from inspection of all foreign arrivals to inspection of about 15% of Hawaii arrivals who fit certain "profiles". Passengers and cargo en route to other States (to the U. S. mainland) are subject to "preclearance activity" by Federal agricultural inspectors; however, agricultural inspection of traffic from the mainland to Hawaii is handled mainly by the State because mainland pests problems do not meet the existing criteria which would warrant Federal inspection of Hawaii-bound passengers and goods.

Sixty percent of the work of the Plant Protection and Quarantine Branch ("PPQ") of the U. S. Department of Agriculture ("USDA") involves preclearance inspections of baggage and exports bound for the mainland. Forty percent is devoted to foreign arrival

inspections, primarily on Oahu. PPQ has three persons trained in entomology, plant pathology and botany at the Honolulu International Airport to interdict prohibited plant materials and pests. Neighbor island staff inspects the small amount of foreign vessel traffic entering the State through ports outside Oahu.

Inspection by the USDA's Animal and Plant Health Inspection Service (APHIS) focuses on federally prohibited agricultural pest species, a list which does not include pests which while harmful to Hawaii, may not be harmful to the mainland, as for example, mealybugs. Sampling of foreign agricultural and vegetable seed lots is discretionary except for those seeds identified by federal law. However, under a operative agreement with the Hawaii Department of Agriculture, PPQ submits foreign seed lots to the Hawaiian Department of Agriculture (HDOA) for noxious weed seed screening.

Since the State has no authority over foreign traffic, State agricultural inspectors rely on Federal inspectors for referrals to intercept State-prohibited species. While cooperation between agencies is good, staffing at both Federal and State agencies has not kept pace with the growth of traffic into Hawaii.

It is recommended that the situation be addressed by the cooperative efforts of the Hawaii Department of Transportation and the Federal Aviation Administration. These cooperative efforts should balance the costs of additional inspections with the benefits to be obtained from such inspections. In addition, the department should also consider the current limitations in funding

availability in its recommendation. Without increased funding and personnel, HDOA and DOT\FAA can accomplish very little.

The Alien Species Prevention and Enforcement Act in 1992 confirmed funding for a first class mail inspection program as a result of the number of inspect pests discovered in packages to and from Hawaii in a trial program. It is expected that the implementation of this program will reduce the introduction of alien and especially harmful pests.

At the Federal level, the National Park Service devotes considerable resources to eradicating or controlling harmful NIS in Hawaii within and outside park boundaries. However, State management on its own lands has been less aggressive.

D. Hawaii's Role in Preventing the Introduction of Alien Species

The Alien Species Action Plan (ASAP) of October 19, 1994 is the product of 80 scientists and other professionals from 20 different federal, state and private agencies and organizations. It calls for a central pest reporting system and central coordinating group; with increased inspections by Postal, Agriculture, Public Health, Customs, FDA, USFWS and military; mapping priority pests; improved quarantine; and starting a large educational/public awareness program. It is the responsibility of the governmental agencies to evaluate the recommendations in cost\benefit measure to determine which recommendations will result in the maximum impact on prevention of the introduction of alien species at a cost which can be allocated for that purpose.

The Nature Conservancy with its 8500 members could coordinate such a program with ie, schools, churches and civic organizations. Extending the runway could bring more tourists and more dollars to pay for these expanded programs. Preventing alien species is always easier than controlling them after they have been introduced. Biological control research is expensive, takes a very long time and is usually unsuccessful, but once it is established, it is very effective and very inexpensive.

The NC/NRDC Study and the NIS Case Study also describe the current responsibilities and activities of the State of Hawaii in preventing the introduction of alien species.

i) Control. The control of established or newly escaped pests in Hawaii is primarily the responsibility of the State although federal agencies carry out pest control on federal lands, enforce endangered species laws and carry out research to improve control methods. Maui has 5 agricultural inspectors who cover 12-14 hours a day, 7 days a week. Private organization are involved in various aspects of alien species control as well.

ii) Inspection. Ninety percent of Hawaii's agricultural quarantine program involves inspection of incoming passengers and goods and other preventive measures although inspection is not complete. State inspectors now use beagle dogs to sniff baggage and cargo arriving from the mainland as well as a portable x-ray unit for random inspection. Penalties for smuggling of prohibited items have been substantially increased and the State list of prohibited plant species is being updated. The Department of Land and Natural

Resources may create a separate list of State-prohibited plant species.

E. Federal and State Efforts to Prevent Introduction of Brown Tree Snake into Hawaii.

The NC/NRDC Study and the NIS Case Study also describe the current efforts of the federal and state governments in preventing the introduction of alien species.

The brown tree snake, a potentially devastating alien species, has turned up in Hawaii at least 6 times between 1981 and 1991 at both civilian and military airports. While inspection of military flights departing Guam for Hawaii have been tightened; no agency in Guam has taken responsibility for inspecting departing civilian aircraft. Aircraft from Guam touching down in Honolulu and going on to Maui should be inspected upon arrival in Maui.

The Federal Government has acted to prevent the introduction of the brown tree snake into non-indigenous areas by including a line item in the budget of the Office of Territorial and International Affairs in the Department of the Interior. Beginning in 1990, the office has annually received $500,000 to $600,000 for brown tree snake research and control of which $100,000 to $200,000 has been earmarked for the Hawaii Department of Agriculture to explore the use of dogs in detecting snakes; other sums have been disbursed partly to the Animal Damage Control unit of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service.

Beginning in 1992, the Department of Defense ("DOD")

appropriated $1 million in new money for brown tree snake research and control, in addition to funds available for the brown tree snake through its Legacy program (which provides for natural resources management on DOD lands).

Congress has also addressed the problem. The Non-indigenous Aquatic Nuisance Prevention and Control Act (NANPACA) of 1990 directs that a program be developed to control the snake in Guam and other areas. Two other bills direct that the Secretary of Defense and the Secretary of Agriculture take steps to prevent the introduction of the brown tree snake into Hawaii. In Hawaii, in addition to the federal funded airport dog teams for snake detection, State-run SWAT teams have been established on each of the islands to respond in the event of snake sightings.

Control of the brown tree snake is based on a three pronged strategy: 1) immediate controls such as the use of methyl bromide for fumigating cargo and the use of toxicants, baits, and traps; 2) inspection on Guam of departing civilian aircraft; and 3) ecological control. The close proximity of the airport to sugarcane fields and therefore to mongoose and rat populations has been suggested as a possible source of biological control via predation, but the dryness of the soils and the low mongoose population makes this idea unworkable.

F. Cooperative Federal and State Activities Re Alien Species Prevention.

Because federal agencies are principally concerned with preventing the introduction of noxious pests into the U. S. from

foreign sources, Hawaii state agencies (principally the Hawaii Department of Agriculture) have a larger responsibility for the prevention of noxious pest introductions from the mainland or noxious pests from foreign sources that may be uniquely damaging to Hawaii. The fact that Maui is probably the most environmentally sensitive with the highest number of ecosystems, and yet, has only 5 agriculture inspectors, could be a potential problem. Therefore, state agencies rely on federal colleagues to notify them about foreign pest introductions that are a threat to Hawaii but may not be prohibited in the U. S. which may not be adequate.

8. Interagency Agreement.

An encouraging first step is an interagency agreement between the National Park Service, U. S. Forest Service, Hawaii's Division of Forestry and Wildlife and Department of Agriculture; and the University of Hawaii is in place to research the biological control of forest weeds.

Most agencies support a plan by the Nature Conservancy of Hawaii and the Natural Resources Defense Council outlined in a 1992 report to improve interagency cooperation. The report recommending the cooperative plan to curb the alien pest species invasion into Hawaii recommended a plan to implement a) mechanisms for pre-entry prevention, b) port of entry sampling and inspection, c) statutes, policies and rules to eliminate gaps in authority and conflicts between agencies spheres of authority, d) development of plans for rapid response of new infestations, and d) cooperation of Federal, State and private group strategies to isolate or eradicate selected

major pests.

The report also recommended joint training among agencies for inspection and response activities, coordinated information systems and research for prevention and control methods, and expanded public aware campaigns. The pest prevention and control systems of New Zealand and Australia were highlighted as instructive models. Cooperation among agencies is critical is addressing these concerns since HDOA does not have the independent authority to conduct mandatory inspections of incoming packages, freight and luggage.

Increased funding for more inspectors and modern equipment presently being considered for LAX, Miami and JFK airports which use x-ray, color x-ray and tomography for fruit and vegetable inspections would ameliorate the situation. Prices will be sent upon receipt from USDA/APHIS/PPQ Jacksonville, Florida. The manufacturer of the color x-ray is Astro Physics/E-Scan (310) 513-1411. Their color x-ray machine is presently being used at LAX in Los Angeles, CA.

9. Prior Alien Species Invasions

A. Control Problem. In the US, the 79 most important introduced pest species costs $97 billion/year in crop loss and control, ie Med-fly and gypsy moth. Agriculture is Hawaii's third largest source of revenue with sugar and pineapple being the two main products. Other agricultural products represent growth opportunities. All of these crops and virtually all their pests are non-indigenous. It is estimated that the Hawaiian export market could increase by 30% if quarantines to control introduction

to the mainland of the Mediterranean fruit fly, the melon fly and the Oriental fruit fly (the "trifly complex") were lifted.

i) Sugar Cane. Most of the pests affecting sugar cane in the last 150 years (such as the sugar cane leaf hopper and the sugar cane beetle borer) were eventually controlled biologically. Where rats exists, damage to stalks increases infestations from egg laying by insect pests. Four new insect pests have become established since 1985. Chemical controls are used on weeds. Research to develop enhanced biological controls continue.

ii) Miconia. Miconia is the most important alien tree species on Maui and can destroy much of the rain forest by shading out all native plant species and causing massive erosion especially at higher elevations. Pure stands of miconia can be found with completely bare understories. Previous attempts to eradicate miconia in the Hana area have made matters worse. It is now endangering at least 50% of all native trees. Miconia was sold as an ornamental in a nursery in Hilo and was introduced on Maui at the Helani Gardens. A study group was formed 4 years ago and recommended helicopter spraying with Garlon herbicide; building access roads; and the possible use of Spike herbicide. Small seedlings and saplings can be killed with a small wipe of Round-up which kills the roots. Biological control is impossible. The use of benzoic and phenoxy herbicides should be avoided due to the drift problem.

Ironwood presents a similar problem, and fountain grass with the wildfire potential and ivy gourd, similar to kudzu, covering

fences, telephone poles, etc.

iii) Ranching. Invasions by various non-indigenous plants is likely. Many alien pests attack imported rangeland grasses. Importation by ranchers of seeds, grasses and animal feed are believed to be the sources of various weeds.

iv) Ornamentals. Non-indigenous plants are an industry. Non-indigenous pests affect and damage the industry i.e. bacterial blight affects anthuriums (South American flower). Red-vented bulbul and red-whiskered bulbul from India damage orchids on Oahu by biting off the flower heads. Several hundred non-indigenous plants introduced for landscaping or cultivation have escaped and are now generally established i.e. banana poka (kills indigenous trees), fire tree, fountain grass, and velvet tree. Federal and State governments fund biocontrol research targeting the banana poka and Koster's curse.

v) Natural Vegetation and Forests. Watershed forests deteriorate under the impact of alien species, principally feral animals. Damage and erosion to native rain forest vegetation permits alien weeds and insects to gain a foothold which de-stabilizes the fresh water resources such vegetation protects. Miconia must be controlled or eradicated.

10. Health Impact of Invasions by Alien Species

Most of Hawaii's streams are not safe for swimming today because of alien pathogens such a leptospira, a Southeast Asian bacterium.

11. Endangered Species

The primary cause of the extinction of native species is predation or competition by non-native weeds and animal pests. A large number (85) of Hawaiian native plant species and 30 of the 70 native bird species are now endangered. Hawaii has 40% of all US endangered bird species. Ninety percent of the state's bird species are unique on earth. There are 3 endangered species in the Kanaha Pond area: the Hawaiian duck, the Hawaiian coot and the Hawaiian stilt; however, none will be unaffected by the run-way extension. Hawaiian Stilts will still walk on runways and taxiways regardless of the length of the run-way. Various techniques have been used at other airports to repel birds, i.e. noise, flashing objects, fake owls, etc.

12. The Need for Public Education to Prevent NIS Introduction

Public and private groups have established educational campaigns related to alien species which include publicity about prohibitions of mailing fruits and vegetables and information outreach about indigenous species. While a State funded video ("It Came From Beyond") is being shown on flights of a few domestic carriers since 1992, there has been little effort to inform visitors of Hawaii's alien species' problem. Many recommend a sterner approach emphasizing the fines and penalties for smuggling of alien species, usually by residents of Hawaii.

13. Impact of Extension of Hilo Airport and Kona Airport Runways

The Big Island is not as ecologically diverse as Maui and has fewer species. It is also more agricultural than Maui in acreage.

While the Hilo Airport and the Kona Airport were both extended without having to do an Environmental Impact Statement, the results of the runway extensions are encouraging in that no significant impact has been reported on The Big Islands from the extensions of the runways of either airport.

14. The FLORIDA Example: Situation and Response

The NIS Case Study discusses the particular problems faced by Florida as well as those faced by Hawaii. Florida's unique combination of features exacerbates the severe problems it suffers from non-indigenous species (NIS). In addition to its subtropical climate, the state has several major ports of entry; substantial pet, aquarium and ornamental plant industries; high rates of human immigration; increasing urbanization; and extensive environmental manipulation.

A. The Problem . Florida's subtropical climate and prolonged growing season, freshwater resources, and ecosystem industries favor the introduction and establishment of NIS. With an average rainfall of 53 inches, average annual maximum and minimum temperature range of 82 and 73 degree degrees F respectively, and vulnerability to tropical weather systems, the climate is conducive to the establishment of NIS which may have limited northward dispersion.

Florida's complex and varied ecosystems present challenges from urbanization and infestation. The 3,500 square miles' of reserved ecosystems of the Everglades National Park and other preserves is one of the largest in the Eastern United States. South

Florida suffers from infestations of several aggressive non-indigenous plants - most of which were deliberately introduced.

Non-indigenous plant species represent about 25% of Florida's total plant species. Florida also has 63% of all U. S. introduced non-indigenous bird species as well as the largest number of established non-indigenous amphibian and reptile species. These species have caused ecological, economic and resource management problems. It is unsettled whether NIS become established by out-competing and displacing indigenous primarily in disturbed habitats or even in undisturbed areas. For examples, the Cuban brown anole lizard has replaced the indigenous green anole in south Florida. However, it is acknowledged that generally, undisturbed areas are difficult for many NIS to colonize.

Because Florida has many routes of entry (uncontrolled as well as controlled), it is particularly vulnerable to NIS infestation. Eighty five percent of all plants shipments into the U.S. pass through the Miami Inspection Station. The number of unintentional releases and escapes of plants and animals once in the U.S. have been documented; special examples of harmful or potentially harmful species being the African giant snail, the cane toad, and the monk parakeet. Deliberate introductions since the 1800's have been extensive; the most disastrous being the introduction of the melaleuca tree and the Brazilian pepper, both are which are spreading rapidly in South Florida. The Hydrilla and the water hyacinth both have caused ecological and economic damages. Mole crickets and a variety of beetles arrived in ship ballast as late

as 1941.

B. Impact of International Flights Miami airport receives flights daily from many third world countries in Central and South America and the Caribbean. All ships and airplanes are inspected and all commodities are subject to search and seizure in a joint effort between USDA/APHIS/PPQ and the Florida Department of Plant Inspection with Custom agents receiving cross-training from USDA. Fruits, vegetables and nursery stock are heavily inspected and quarantined (75-100% of high risk shipments are inspected and x-rayed). A computer program is being prepared to specifically target high risk countries/commodities/and pests, ie cut flowers/California/brown garden snails at certain times of the year, but more importantly, Guatemala, the Philippines, Jamaica, and several countries in South America are especially targeted. Port of exit inspections and special education programs have been set-up in high risk countries especially aimed at the agricultural and travel industry.

FDPI has 120 inspectors and supervisors who charge $70 to inspect each vehicle. Companies importing commodities pay up to $460/year. USDA has 150 inspectors in Miami alone that inspect all commodities and have authority to seize commodities. All ships and airplanes are inspected including galleys, cabins, cargo bays and boxes or packages. X-ray for fruits and vegetables is in operation and a new color x-ray is being set-up and a new 3-D x-ray (tomography) is being considered.

Even with all of the coordinated efforts in Florida, 5 major

pests have recently been introduced or re-introduced in the state during the last five years: the brown citrus aphid (Nov., 1995), citrus canker (1993 and 1995), Med fly (1995), Oriental fruit fly (1995) and the citrus leaf miner (1991). Citrus is the largest commodity produced in Florida.

C. Industry Involvement. Both the Australian pine and the Brazilian pepper, major pest plants in Florida, were introduced by the ornamental industry. Most of Florida's 19 non-indigenous fish special escaped from aquarium fish culture facilities. Pet merchants and pet owners are responsible for the escape of tropical birds, reptiles and mammals. The Florida Department of Agriculture has destroyed 15,000 citrus trees in South Florida in the last eight months trying to eradicate citrus canker. Ten years ago we destroyed 20 million trees at a cost of $200 million dollars for the same disease (Florida Times Union Newspaper, May 19, 1996).

D. Impact of Population Growth and Urbanization. Florida's population is concentrated in the Miami-Fort Lauderdale, Tampa- St. Petersburg, and Orlando areas. NIS dominate many urban sites in south Florida. Land and water resource development resulting from Florida's rapid population since 1980 has results in several alteration of Florida's natural ecosystems creating opportunities for NIS invasions.

E. Findings of Causes and Consequences The alteration of natural habitants, especially in South Florida, have presented opportunities for NIS invasions. Invasive NIS have disrupted navigation and recreational activities, displaced indigenous

wildlife and reduced biological diversity.

F. Water Management in South Florida Water management programs have facilities the spread of non-indigenous plants and fishes. The drainage of the Everglades over many years permitted urban development and agriculture but destroyed half of the Everglades. The remaining fragments operate poorly as water and food supplies are distorted and polluted. Non-indigenous trees such as the melaleuca and Brazilian pepper trees have altered the natural water flow thus decreasing the populations of nesting wading birds and encouraging the spread of non-indigenous fishes and aquatic plants. Pollution by nitrogen and phosphorus from sugar cane production has been linked to excessive growth of hydrilla.

G. NIS Spread and Economic Costs.

i) Melaleuca. Over 450,000 acres are currently infested with melaleuca trees having a rate of spread of 50 acres a day, threatening all of Florida's wetlands. Indigenous to Australia, it has no natural predators and diseases in Florida; thus is monoculture has replaced various natural habitats. Melaleuca control programs have been expensive. Costs for removal of trees range from $500 to $200 per acre with estimate management costs in south Florida over $1,000,000 a year. It is estimated that elimination of the melaleuca would benefit the state's economy.

ii) Hydrilla. Statewide costs for controlling hydrilla were in excess of $7 million annually and losses from the negative impact on tourism (especially fishing) is huge due to the choking effect it has on waterways and lakes.

iii) Burrowing and Citrus Nematodes, Fire Ants, Brazilian Pepper, Mole Crickets, Citrus Canker, Med Fly. Each of these NIS has a damaging impact on Florida's agriculture and presents a funding cost for control and eradication efforts. Many NIS have negative human health consequences.

H. Specific Management Programs

The Exotic Pest Plant council (EPPC), an organization of 40 member agency as well as local and private groups, promotes coordinated efforts in developing management programs, assisting in preparing appropriate legislation, seeks government funds to manage invasive plants in wetlands and upland forests, and organizes symposia. The EPPC in cooperation with state and federal agencies has established a melaleuca-free buffer zone along the eastern boundary of the Everglades National Park. While manual removal of trees and herbicides are today's control mechanisms, research in under way to identify biological control agents.
Mechanical removal and herbicides are also used to control hydrilla.

Recent successes include the eradication of citrus canker, the Medfly, the giant African snail, and 13 species of insects, viruses and rusts.

I. Long Term Needs. Successful management and eradication programs for NIS problems require an educated public, coordination among agencies, and consistent funding. An inventory of NIS, distribution and impact is needed to set management priorities. Early detection reduces costs of control. A new management of

water flow is needed to enhance the capability of the Everglades to withstand invasions by NIS. In 1993, impacted parties agreed to a 20 year restoration and clean up plan costing $465 million dollars.

J. Coordinated Efforts for Managing NIS. Councils like the EPPC can be a model for coordinating work of agencies and interesting parties, encouraging consistency in policies and control methods, as well as enhancing public education. In addition, the University of Florida is establishing a "Center for Excellence" to combine academic and governmental expertise to coordinate biological control research and implementation of biological control agents.

15. CONCLUSIONS

Therefore, extending Runway 2-20 will have a significant positive impact on safety and result in savings in costs and time. There will be little if any impact on the rate of introduction of alien species to Maui, air quality or endangered species especially if agencies involved obtain the support of the state legislature for funding for personnel and equipment and the cooperation of the residents of Maui for needed education. The concerns mentioned in this report and the suggested mitigation procedures will hopefully be considered by the agencies involved.

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The Alien Pest Species Invasion in Hawaii:

Background Study and Recommendations for Interagency Planning

Prepared by:

The Nature Conservancy of Hawaii
Natural Resources Defense Council
July 1992

EXHIBIT "B"

THE NATURE CONSERVANCY OF HAWAII

• 1116 SMITH STREET • SUITE 201 • HONOLULU, HAWAII • 96817 • PH. [illegible] • FAX [illegible]

WHAT IS THE NATURE CONSERVANCY:	The Nature Conservancy of Hawaii is an affiliate of The Nature Conservancy, an international non-profit organization which, since 1951, has been the private sector leader in preserving Earth's rare plants, animals, and ecosystems by protecting the habitat they need to survive.
ESTABLISHED IN HAWAII:	1980
HAWAII MEMBERSHIP:	8,500 and growing
NATIONAL MEMBERSHIP:	650,000 and growing
WHAT THE CONSERVANCY DOES:	Using cooperation rather than confrontation, the Conservancy forges effective partnerships with business, government, individuals, and organizations that share a concern about the escalating rate of extinction worldwide.
HOW LANDS ARE ACQUIRED:	Lands are acquired by gift, exchange, purchase, conservation easement, or management agreement. The Conservancy maintains these lands as a public trust, providing conservation management and encouraging scientific, educational, and recreational use.
TOTAL ACREAGE UNDER CONSERVANCY PROTECTION:	In Hawaii, the Conservancy has been responsible for the protection of 48,254 acres on five islands, 29,070 of which it currently manages either directly or cooperatively. The remaining 19,184 acres are now managed by the National Park Service and the U.S. Fish and Wildlife Service.

NRDC

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NRDC is a non-profit environmental policy analysis and advocacy organization, with close to 1,000 members in Hawai'i, nearly 165,000 members nationwide, and other offices in New York, Washington, D.C., San Francisco, and Los Angeles.

The Honolulu office is currently working on issues relating to protection of native species and their habitats, including advocacy for adequate funding for natural resources research and management in the national parks and wildlife refuges in the state, as well as for the State's Natural Area Reserves System and other protected areas. In 1989, NRDC issued Extinction in Paradise: Protecting Our Hawaiian Species. This report documented, among other issues, the impact of alien pest species on native flora and fauna as a major native species protection problem. Additional advocacy for native species protection involves implementation of the State's land use, water resources, and coastal zone laws to that end.

Drawing on both inhouse and mainland organizational expertise, NRDC is actively contributing, both practically and in policy development, to the growing interest in Hawai'i in energy efficiency and energy conservation. In addition, a study of the research literature on groundwater pollution, primarily on O'ahu, is providing background for a report with recommendations on improved monitoring and prevention systems, with the latter including low-input agriculture. The findings will be used in a campaign to educate citizens regarding the policy options for groundwater protection.

Staff in the Honolulu NRDC office are: Susan E. Miller, Hawai'i Representative; Clyde S. Murley, Scientist; and Martina Arakaki, Program Assistant.

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Appendices and Figures

Acknowledgments

The most gratifying aspect of preparing this study has been the experience of getting to know the dedicated professionals who are working to protect Hawaii from the complex alien pest threat. Appendix E lists those individuals who provided information through interviews, workshops or written materials. This report is dedicated to them and to their colleagues, with the hope that it will help them develop the strategies and the support they need to accomplish their important jobs.

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The principal authors of this report were Susan Miller (NRDC) and Alan Holt (TNCH), who were assisted by Jodi Bailey (TNCH) and Susan Machida (Lacayo Planning).

Executive Summary

The silent invasion of Hawaii by pest species—weeds, disease organisms, predators, insects, etc.—has far-reaching consequences for the State's people, economy and natural environment. Pest species already established in Hawaii are responsible for large losses of agricultural and horticultural crops. These pests limit the shipment of local produce to mainland markets, damage native forests, streams and watersheds, compete with native flora and fauna, and carry diseases that affect native species, agricultural crops, livestock and humans. The magnitude of the threat posed by the continual introduction of alien species into the State has led to widespread agreement among scientists, farmers, environmental groups and government agencies that stopping the influx of new pests is essential to Hawaii's future well-being.

This report describes and assesses the current systems used in Hawaii to prevent the introduction of unwanted alien species and to respond to those pests that succeed in entering the State. It is intended to help focus coordinated, multiagency planning to solve the complex alien pest problem.

Hawaii has been actively involved in alien pest prevention and control for a century. Today, at least 20 state, federal and private organizations and a number of volunteer groups dedicate a major part of their resources to this area.

Prevention

In general, federal agencies in Hawaii are concerned with preventing the introduction of noxious pests into the U.S. from foreign sources and preventing pests established in Hawaii from reaching the U.S. mainland. Their work is guided by federal laws and rules that have evolved with a focus on protecting large-scale mainland agriculture and enforcing international trade agreements. The U.S. Customs Service, U.S. Fish and Wildlife Service, U.S. Department of Agriculture's Animal and Plant Health Inspection Service, and the U.S. Department of Defense's Military Customs Inspection Program are the federal agencies most involved in prevention activities.

Compared to federal agencies, state agencies have a larger responsibility for the prevention of noxious pest introductions that may be damaging to Hawaii. State

agencies assume most of the task of preventing U.S. mainland pests from reaching Hawaii. Because of Hawaii's tropical environment and unique natural history, the State is vulnerable to far more foreign pests than the typical mainland state. Therefore, state agencies rely on federal colleagues to call them in on foreign pest introductions that pose a threat to Hawaii but may not be prohibited in the U.S. The Hawaii Department of Agriculture carries out virtually all of the State's prevention programs. Several volunteer task forces and private educational programs have also been initiated to bolster public awareness and promote improved prevention systems.

Control

The control of established or newly escaped pests in Hawaii is primarily the responsibility of state government, although federal agencies (U.S. Fish and Wildlife Service, National Park Service and U.S. Department of Agriculture) carry out pest control operations on federal lands, enforce endangered species laws, and carry out research to improve control methods. The lead state agencies involved in control are the Department of Agriculture and the Department of Land and Natural Resources. Private organizations including the Hawaii Sugar Planters' Association, Bishop Museum, The Nature Conservancy of Hawaii, and Hawaii and Maui Humane Societies are involved in aspects of alien species control as well. While there is some coordination among these agencies and groups, most focus only on agriculture or human health, or native ecosystem pest problems.

Problems

Despite the efforts of these organizations, unwanted alien species are entering Hawaii at an alarming and increasing rate. Since the 1970s, an average of 20 new alien invertebrates (insects, molluscs, etc.) per year were recorded in Hawaii. This is an increase from 16 per year between 1937 and 1960. (By comparison, scientists estimate that before man's arrival, a new invertebrate became established in Hawaii on a rough average of only once every 10,000 years. The current rate of invasion, then, is about 200,000 times more rapid than the natural rate.)

Approximately one-half of the immigrant invertebrates established between 1981 and 1991 are regarded as economic pests. One in twenty—or about one per year—is a "serious" economic pest. Since 1985, four new insect pests of sugarcane have become established; of these, the lesser cornstalk borer alone has already cost sugar planters an estimated $9 million.

While information on how these pests are entering the State is incomplete, inspectors estimate that most are entering via airline passenger flights, first-class mail and cargo. The mainland U.S. is the leading source of pests, followed closely by southeast Asia, tropical America and the southwest Pacific.

A two-phased planning process is suggested, to begin in the summer of 1992. Phase 1 should result in:

a) *Pre-entry prevention strategy;*

b) *Port-of-entry sampling and inspection strategy;*

c) *Statute, policy and rules review to clarify conflicts/gaps and determine a coordinated approach for resolving them;*

d) *Rapid response strategy; and*

e) *Statewide control strategies for selected, established pests.*

Phase 2 planning is intended to draw on the products of Phase 1 to produce:

a) *Cohesive training strategy;*

b) *Coordinated data systems;*

c) *Coordinated research strategy; and*

d) *Expanded public awareness campaign.*

For both political and technical reasons, this process will be a major undertaking. To succeed, it should be guided by a simple, clear policy statement identifying the standard of excellence Hawaii aspires to in this field (e.g., "Hawaii will develop a pest prevention and control system that is the most effective in the world", or "...that reduces the influx of new pest species into the State to ten percent of present levels by the year 2000"). Because of its long history and broad involvement in this area, the Hawaii Department of Agriculture is the most appropriate agency to lead such a planning effort.

Chapter 1 Introduction

Each year, millions of visitors travel to Hawaii, attracted to the islands' beauty, mild climate and relaxed lifestyle. But the islands are not just a paradise for human visitors. Many new species of plants, animals, insects and micro-organisms are brought to the islands along with visitors, cargo and other traffic. Some are brought accidentally, in shipped or mailed goods or in the baggage of unwitting vacationers and returning residents. Others are brought intentionally, with or without the necessary legal approvals. Unfortunately, some of these alien species become costly and dangerous pests—unwanted guests who may take up permanent residence.

This silent invasion of pest species has far-reaching consequences for the state's people, economy and natural heritage. Pest species already established in Hawaii are responsible for large losses of agricultural and horticultural crops. These pests limit the shipment of local agricultural products to mainland markets, damage native forests, streams and watersheds, compete for food and habitat with native flora and fauna, and carry diseases that affect native species, agricultural crops, livestock and humans. The magnitude of the threat posed by continual introduction of alien species into the State has led to widespread agreement among scientists, farmers, environmental groups and government agencies that stopping the influx of new pests is essential to Hawaii's future well-being.

The Purpose and Scope of This Report

The purpose of this report is to assess the current systems used in Hawaii to prevent the introduction of unwanted alien species and to respond to those pests that succeed in entering the State. The Nature Conservancy of Hawaii (TNCH) and the Natural Resources Defense Council (NRDC) have prepared this report with the intention that it be used to help focus coordinated, multiagency planning to solve the complex alien pest problem.

This report illustrates key facts and identifies issues requiring further attention. It is not a comprehensive review of the impacts of pest species or the work underway to counter those impacts. In particular, precise cost estimates for pest impacts or prevention and control programs are difficult to obtain, primarily because some costs mingle with the costs of other programs, and many impacts are not precisely measured. Nevertheless, the authors are confident that the figures given herein

accurately illustrate the size and kinds of costs that are occurring. It is expected that upon reading this report, agency staff and others will be able to provide additional, useful information. These additions will be compiled and distributed as an addendum.

The information in this report has been gathered from existing literature, interviews with agency officials and other experts, and from a workshop of state and federal agency staff held for this purpose. This work was largely completed during 1991. Although a committee of experts reviewed drafts of the report, the TNCH and NRDC authors are responsible for its final contents.

Distinction Between Native and Alien Species

Throughout this report the term "native" is used to describe species of plants, animals, insects or other organisms which were already established in Hawaii before the first humans arrived. These species evolved here over millions of years. Most live nowhere else on the planet and they form the diverse forests, reefs and other native ecosystems that protect our climate, water sources, fisheries and natural beauty. Native species are also called "indigenous" if they are native to Hawaii and to other parts of the world, or "endemic" if they are known only from Hawaii.

The terms "alien", "non-native", "exotic", or "introduced" are used to indicate species that arrived here with the aid of humans, whether through intentional or accidental means. Clearly not all alien species are undesirable. Agriculture in Hawaii, for example, is based entirely on alien plants. Many of the brilliant flowers such as orchids and anthuriums, and mango, coconut and banana trees which symbolize Hawaii in the minds of visitors and residents alike are actually alien species. The next chapter, however, describes the negative consequences of introduced species that become troublesome pests.

Chapter 2 Hawaii Pays a Heavy Price

Hawaii pays a heavy price for the presence of alien pest species. Currently, unwanted alien species invade nearly every facet of life in Hawaii. (Refer to Appendix A for an explanation of how Hawaii's unique natural history makes the islands particularly vulnerable to invasion by new life forms.)

Agriculture

Hawaii's agricultural industry grosses nearly $1 billion per year—the third largest revenue source in the State behind tourism and military-related spending. Many pests limit Hawaiian agriculture, and new pests are a constant threat. Industry experts estimate that market limitations due to alien Mediterranean, Oriental and melon flies are costing Hawaii $300 million each year in lost markets for locally grown produce. These foreign pests caused $3.5 million in damaged produce (particularly papaya) and $1 million in postharvest treatment costs in 1989 alone.[1] (Refer to pages 71-79 for endnotes and list of references.) For fiscal years 1987-1990, the Governor's Agriculture Coordinating Committee (GACC) expended a total of $3,831,981 (or an average of $957,995 per year) for research to control or eliminate pest impacts on agricultural commodities.[2] In addition to the state's existing alien pests, new agricultural pests are arriving in Hawaii at an unacceptably high rate. Since 1985, four new insect pests of sugarcane have become established in Hawaii, costing sugar planters over $9 million in additional pest control efforts.[3]

Watersheds and Water Supply

Watershed forests, the primary source of surface water and groundwater recharge on the main Hawaiian Islands, are deteriorating under the impact of alien species. Pigs, goats, axis deer and other non-native animals have spread into remote areas far from hunters and one or more of these species have damaged fragile native rain forest vegetation in virtually every mountain watershed in the State. Where these animals invade and are not controlled by hunting, erosion hastens, and alien weeds, insects and other pests gain a foothold, de-stabilizing native forests and the fresh water resources they protect. Pigs and other alien hoofed animals are a primary

cause of nonpoint source pollution, contributing to siltation and unsafe fecal coliform levels in several watershed recharge and coastal areas.[4] During FY90, federal, state and private forest managers spent over $3 million—over 75 percent of their resource management budgets—to reduce the damage caused by alien species.[5]

Extinction of Native Species[6]

Thirty of Hawaii's 70 surviving native bird species are now endangered, representing 40 percent of all the endangered birds in the United States. Of these, 12 species are depleted to such low numbers that they may be beyond recovery. Additionally, 85 Hawaiian plants are on the U.S. endangered species list, with work underway to add another 103 in the next two years. Of these, 96 species have no more than 100 individuals surviving, with six species reduced to a single plant. Ninety percent of Hawaii's dryland ecosystems and roughly one-half of the State's original moist or wet forests are already lost.

The primary cause of these losses, and the greatest single threat to native species, is predation or competition by non-native weeds and animal pests. The value of unique Hawaiian species is difficult, if not impossible to calculate. Not only are they valuable components of the ecosystems that sustain Hawaii's climate, watersheds and scenic beauty, they are also reservoirs of untapped genetic information of potential value to agriculture, medicine and industry. Once lost, they can never be replaced.

Housing

In 1985, the "conservative estimate" to prevent infestation, undertake remedial control and repair damage caused by the Formosan subterranean termite in Hawaii was $50 million per year. Before the introduction of this pest in 1907, Hawaii had no termites.

Rangeland

The yellow sugarcane aphid first appeared in pastures in Kona in mid-November 1989. This insect affects the protein quality in Kikuyu and other pasture grasses. (Kikuyu grass is itself an alien species but is valuable to ranchers in many areas.) This new pest had infested 18 percent of the Kikuyu grasslands by May 1990 and 35 percent by April 1992.[7] Ranchers anticipate reduced animal weights and subsequent income losses, especially if, as expected, long dry spells foster the rapid spread of this aphid. (One agency official regards the effects of this aphid infestation as "a disaster waiting to happen.")[8]

Certain undesirable alien grasses invade and diminish the quality of productive rangeland, and threaten property and native species by promoting wildfire. In 1986, a wildfire fueled by the non-native fountain grass devastated one of the last

significant stands of native dryland forest near Puu Waa Waa on the Big Island. Suppression of the fire cost nearly $100,000 in public funds.[10] It destroyed or damaged nine rare or endangered plant species, including one known only from that area.[11] Nearly every year, this same pest fuels fires that threaten subdivisions and commercial developments in the Kona and South Kohala regions.

Human Health[12]

In the 18th century, the native Hawaiian population was literally decimated by diseases imported to Hawaii through western contact. Today, Hawaii is receiving very few diseases (AIDS being the single new disease introduced during the 1980s) and has been highly successful in controlling vaccine-preventable diseases.

Most of Hawaii's streams, however, are not safe for swimming today—not because of chemical pollution, but because of alien pathogens. Leptospira, a bacterium from Southeast Asia that causes the disease leptospirosis, has entered our streams through alien rats and feral pigs. Hawaii now has more cases of leptospirosis than all mainland states combined. There were 66 cases resulting in two deaths in Hawaii in 1989 alone.[13] Tourists and residents encounter warning signs about the disease at every scenic stream or waterfall from Akaka Falls to Kukee State Park.

Economy

Alien pests are a major threat to Hawaii's present and future economy. For example, while recent media attention focuses on the potential impacts of the alien brown tree snake to Hawaii's environment, this pest, if not controlled, can also result in major economic losses to the State. A longtime menace to Guam, brown tree snakes on that island today number 10,000 to 30,000 snakes per square mile.[14] Besides being responsible for the extinction of nine of the island's eleven native bird species, brown tree snakes cause over 100 power outages annually and cost Guam's Power Authority, businesses and residents millions of dollars. Indeed, Guam's situation is so severe, officials believe eradication is nearly impossible regardless of the amount of money spent.

Because of the frequent number of military and civilian flights between Guam and Hawaii, and the natural characteristics of this particular pest (nocturnal, able to live long periods without food, tolerant of disturbed habitats, and broad range of feeding habitats), the State is particularly vulnerable. Between 1981 and 1991, Hawaii officials discovered six brown tree snakes on Oahu airports—three within the last two years. With growing competition for the international tourist market, any infestation of snakes and the resulting publicity will damage Hawaii's image as a resort "paradise."

Chapter 3 Current Systems for Preventing Pest Introductions

This chapter describes the agencies and private organizations involved in preventing the introduction of new pests to Hawaii, and the processes through which these groups interact to prevent introductions. (Refer to Appendix B for the statutes and regulations governing these agencies and processes; Appendix F for definitions of acronyms and initials.)

A. FEDERAL AGENCIES

In general, federal agencies in Hawaii are concerned with preventing the introduction of noxious pests into the U.S. from foreign sources, and preventing pests established in Hawaii from reaching the U.S. mainland. Their work is guided by federal laws and rules that have evolved with a focus on protecting large-scale mainland agriculture and enforcing international trade agreements.

1. U.S. Customs Service (U.S. Department of the Treasury)[15]

The Customs Service is responsible for clearing imports and collecting duties from all vessels, cargo and people entering the U.S. from foreign countries. Customs serves as the primary filter for items of concern to many other organizations, enforcing over 1,000 laws for some 100 other state and federal agencies. Customs has broader powers than any other agency involved in pest species problems to search, seize and hold items; the service does not need a search warrant or to show probable cause to carry out its duties, which include inspecting foreign mail. (Domestic first-class mail may not be inspected without a federal search warrant. For more information, refer to the section on the U.S. Postal Service.)

Honolulu is a major port of entry to the U.S.—fourth busiest in international arrivals in the nation. The agency's current priorities are (1) illegal drugs, (2) currency violations (counterfeiting), (3) high-tech weaponry (export), (4) child pornography and (5) commercial fraud. Customs inspectors in Honolulu seize prohibited plants, animals or their products daily. Penalties are based on U.S. Fish and Wildlife Service-Law Enforcement or U.S. Department of Agriculture-Animal and Plant Health Inspection Service statutes and regulations.

Inspection Activities

Customs requires a manifest from the shipping agent of all in-coming cargo. Until the end of World War II, all cargo entering the U.S. by way of Honolulu passed through the service's own warehouse and docks that were sealed and guarded against smuggling. Today, the shipper holds imported goods against a bond. Customs always inspects certain types of cargo, such as aquarium fish, before granting entry. Others, such as new cars, are rarely inspected.

Through its computer system, the agency classifies all cargo to determine its rate of duty and to track import quotas and other items of concern. This system flags any special information about an item: and identifies those items requiring inspection or approval by any other agency. The U.S. Department of Agriculture (USDA) and U.S. Fish and Wildlife Service (USFWS) have the opportunity to review all in-coming plant or animal materials for Customs. The computer system also "profiles" likely sources of illegal items to help target inspections. Although this capacity currently focuses on profiling likely drug smuggling, the system is also open to other agencies to profile suspected sources of pest organisms.

Effective April 1991, the service began implementing a new policy which facilitates tourist travel by minimizing inspection of in-coming passengers arriving from certain low risk areas. Passengers who have visited high risk areas of the world (associated with drugs, contraband, alien species) receive a more careful examination.

All packages mailed from outside the U.S. must have customs declarations that clearly state the nature of the contents. Customs can inspect any mail from foreign points of origin. In addition, Customs generally conducts spot checks to re-inspect selected military cargo and passengers previously inspected by Military Customs Inspectors (described later in this chapter).

Resources

In FY91, Customs had a total staff count of 152, including about 100 inspectors, and a budget of $7,620,642 servicing Hawaii and Guam. (These figures represent resources for all Honolulu District Customs interdiction programs—not just for alien species prevention.)[16]

2. U.S. Fish and Wildlife Service (U.S. Department of the Interior)[17]

The U.S. Fish and Wildlife Service Law Enforcement Division (USFWS-LE) has responsibility for all imports of wildlife or wild plants into the United States from foreign sources. The division also deals with exportation of wildlife to foreign destinations. Such imports in the Pacific may be brought through Honolulu, which is a "designated" port, or Agana, Guam, which is a "special port." A USFWS-LE

inspector must inspect and clear all these imports before they are released from detention by a Customs officer.

The wildlife inspectors are responsible for ensuring that all wildlife, wild plants and related products entering or leaving the United States are in compliance with federal and state laws and international treaties, including the Endangered Species Act and the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES).[18] Close monitoring of the rapidly growing Pacific Rim trade is needed to deter illegal traffic in wildlife and wildlife products. Of particular concern are products of ivory, sea turtle and various reptile skins.

Inspection Activities

In Honolulu, three inspectors and one special agent carry out the work of USFWS-LE at the Honolulu International Airport and the Honolulu Harbor. One inspector is assigned to air cargo and the airport U.S. Mail facility, another is assigned to international arrivals at the airport, and the third inspector is at the Honolulu waterfront. Inspector duty hours are Monday through Friday, 7:30 a.m. to 3:30 p.m. Much of their work involves examining baggage and mail referred to them by Customs and from in-coming cargo. USFWS-LE inspects 100 percent of mail and baggage items referred to them by Customs inspectors and 50 percent of cargo, generally. (This is one of the highest inspection rates in the nation; the average inspection of cargo is ten percent). In addition, USFWS-LE inspectors check all wildlife being imported or exported under CITES permits. Fines and/or imprisonment penalties derive from provisions of laws enforced by the agency. A fourth inspector, connected with the Honolulu office, is stationed on Guam. The Guam inspector conducts inspections at the port in Agana, Guam and at Anderson Air Force Base, and trains Military Customs Inspectors (MCIs).

While USFWS-LE inspectors in Honolulu encounter animal parts or products daily, there was one live seizure from a foreign source in 1991 and an estimated ten seizures within the last 14 years. In addition, USFWS-LE has responded two or three times to an organism found by Customs in military shipments. (In Guam, however, the USFWS-LE inspector encounters wildlife in military shipments more frequently.)[19] When illegal items are discovered, USFWS-LE inspectors refer them to the USFWS-LE special agent.

Although based in Honolulu, the special agent is responsible for the entire U.S. Pacific, and is not a regular part of the inspection team. (Inspectors report to the Region 1 USFWS Office in Portland, rather than to the special agent in charge in Honolulu.) On-call for any of the inspection areas on Saturdays, Sundays and after hours, the special agent is authorized under ESA, CITES and the Lacey Act, to search for (with a federal warrant) and seize illegal wildlife, and issue citations for illegal importations.

Resources

The USFWS-LE operating budget for FY91 was $165,000 for the Honolulu Wildlife Inspection Program (inspectors); $135,000 for the Honolulu Enforcement Program (Special Agent); and $150,000 for the Guam Wildlife Inspection Program (inspector).

3. Plant Protection and Quarantine Branch, Animal and Plant Health Inspection Service (U.S. Department of Agriculture)[20]

The Plant Protection and Quarantine Branch (PPQ) of the Animal and Plant Health Inspection Service (APHIS) is responsible for preventing importation of plant and animal diseases and pests into the United States. Under the Federal Noxious Weed Act of 1974 (see Appendix B), PPQ also restricts the entry of those weeds and their seeds determined to be harmful to U.S. agricultural crops, livestock, irrigation, navigation, fish and wildlife resources, or the public health. Although PPQ in other states engages in control programs for established pests, Hawaii's program is primarily devoted to prevention through inspections. Their inspection activities apply only to shipments entering Hawaii from foreign sources or those bound from Hawaii to the U.S. mainland; PPQ does not inspect U.S. mainland shipments to Hawaii.

PPQ can order the destruction, treatment or the return to point of origin of any item found to contain pests. Treatments include chemical dips, fumigation with a chemical such as methyl bromide, or cold treatment by storage in USDA-approved cold storage containers or vessel holds for a period of time based on commodity type. PPQ oversees chemical dips or fumigation conducted by commercial firms providing the service. The shipper assumes the total cost of treatment.

Inspection Activities

Sixty percent of PPQ's work in Hawaii involves preclearance inspections of baggage and exports bound for the U.S. mainland. PPQ must certify these as pest-free before they may be shipped. Neighbor island PPQ offices (Hilo and Kona on Hawaii, Kahului, Maui, and Lihue, Kauai) deal almost exclusively with preclearance inspections of baggage and cargo leaving the airport for the mainland. The principal export items inspected by PPQ inspectors are fruits, vegetables and cut flowers.

The remaining 40 percent of PPQ's time is devoted to foreign arrival inspections. These take place primarily on Oahu where PPQ operates at the international airport, Honolulu Harbor, the main post office, and major military bases at Pearl Harbor Naval Base, Hickam Air Force Base, Barber's Point Naval Air Station, and Kaneohe Marine Corps Air Station. Neighbor island PPQ staff inspects the small amount of foreign vessel traffic entering the State through ports outside Oahu.

PPQ is called in as deemed necessary by Customs inspectors when plants or plant material are found in baggage or cargo of foreign origin. PPQ may also review cargo manifests or inspect organic packing material that may support organisms. With the high volume of arriving goods, the inspectors, in general, sample at least two percent

of the total commodity; the specific sampling techniques vary with each commodity. PPQ inspects all plants, cut flowers, fruits and vegetables.

Sampling of foreign agricultural and vegetable[21] seed lots is discretionary on the part of PPQ. Guidelines are set every federal fiscal year identifying those seed lots that should be sampled and those that can be allowed entry without sampling. In the past, Hawaii's Department of Agriculture (HDOA) has recommended that all foreign agricultural and vegetable seed lots be inspected, so they can screen for weed seeds and other pests, and monitor the quality of seeds being offered for sale in the State. Currently, PPQ continues to screen only seeds identified by federal law. If the lot contains seeds from any of the 11 species currently listed by the Federal Seed Act (FSA) as "noxious weeds," PPQ will deny entry of that lot.[22]

In Hawaii, PPQ has a cooperative agreement (effective 1985) with HDOA for assistance in identifying seeds imported into Hawaii. Under the agreement, PPQ submits foreign seed lots to HDOA for noxious weed seed screening. In addition to screening for the 11 noxious weeds identified by the FSA, the agreement provides for screening for contaminants prohibited by other federal regulations and allows HDOA to check the seed lots for compliance with state noxious weed and seed laws. This saves the expense of sending the seeds to the U.S. mainland for identification and speeds the release of desirable seeds destined for Hawaii. PPQ uses local, national and international reference collections to make noxious weed seed identifications.

In addition, PPQ has three "identifiers" stationed at Honolulu International Airport who are specifically trained in entomology, plant pathology and botany. These individuals are able to identify a majority of pests and plant materials entering Hawaii. All PPQ officers are trained to identify pests commonly intercepted at Hawaii ports. To ensure that the officers maintain and update their skills on any newly discovered pests, the identifiers develop and distribute "identification kits" to PPQ officers on an on-going basis. PPQ also has a staff of identifiers at the national level who assist with identifying difficult species of pests.

Guam

In Guam, a single PPQ Officer in Charge provides technical support for the Guam Department of Commerce (Customs) and Guam Department of Agriculture personnel. These two departments are responsible for enforcing USDA-PPQ regulations on Guam. Guam arrival inspection operations include maritime vessel and cargo clearance, airport air freight and passenger clearance, and military vessel and aircraft clearance. Clearance of foreign arrivals is handled by Guam Customs at the maritime port and military bases, and by Guam Department of Agriculture inspectors at the airport.

Unlike Hawaii, on Guam, there is no staff of PPQ officers to conduct inspections nor is there any preclearance inspection for passengers or cargo. Arrivals from Guam to Hawaii are treated like all other foreign arrivals by Honolulu PPQ inspectors.

Resources

The PPQ operating budget for Hawaii was $12 million in FY91. The branch has a staff of 96 in its Honolulu office, seven in Hilo, eight in Kona, nine on Maui, five on Kauai, and one on Guam, for a total staff of 126.

4. Military Customs Inspection Program, U.S. Pacific Command (U.S. Department of Defense)[23]

Military Customs Inspectors (MCIs) are an adjunct to U.S. Customs and USDA-APHIS. They are responsible for implementing federal customs statutes and agriculture regulations for transfers of military goods and personnel from overseas into U.S. jurisdiction. (MCIs do not inspect goods and personnel transferred to Hawaii from the U.S. mainland, or vice versa.). MCIs are trained to look for prohibited animals, soil, seeds and other pests. An annual conference involving U.S. Department of Defense Pacific Command (PACOM) staff, U.S. Customs and USDA updates the knowledge of military Customs Coordinators, who train the MCIs.

Fines and/or penalties are generally based under the Uniform Code of Military Justice (UCMJ). Under UCMJ, prosecution for a violation of customs rules and regulations in the course of personal property shipments relating to a military assignment normally rests with the local commanding officer or military prosecutor. However, once the shipment enters the Customs territory of the United States, U.S. Customs, as a federal agency, has the right to claim jurisdiction over the shipment. Although they have "first claim," U.S. Customs may waive jurisdiction back to the military for prosecution of the personnel involved.

The territory covered by PACOM extends from the U.S. Pacific coast to Africa and from the North Pole to the South Pole. U.S. bases and exercises in Guam, Hawaii, Japan, Korea and the Philippines are specific responsibilities of the PACOM Customs Coordinator.

Inspection Activities

When military transport flights arrive from foreign points of origin, MCIs look for flying insects in the cabin areas and spray as necessary. In addition, MCIs review actual "packout" of household and personal goods transferred to the U.S. from a foreign duty station. The reviews are of two kinds: an inspection—a general quality control check, or an examination—a more intensive "finetooth comb" search. All material involved in packouts undergoes one or the other kind of search. In a recent three month period (reporting is quarterly), MCIs inspected 3,003 unaccompanied baggage items and examined 8,740 items. During the same period, they inspected 3,878 lots of household goods and examined 3,192 lots. These reviews of household goods led to 586 contraband seizures and withdrawals (owners willingly destroyed

or disposed of the prohibited item at the point of origin). Items seized and/or withdrawn during the three month period included:

Potted live plant
Decorated egg shell
Cobra skin, unfinished (tanned skins are permissible)
Coral with dirt
Meat not properly processed
Bags of soil
Shark's teeth with dirt
Snail shells with dirt
Local spices, including seeds
Mattresses stuffed with straw or raw cotton
Termite-infested furniture
Broom with rice seeds and straw
Toy animals stuffed with raw cotton
Flower arrangements with seeds
Assorted fruit seeds

MCIs will also review troops, gear and equipment returning to areas of U.S. jurisdiction from military exercises outside the U.S. When necessary, MCIs will also steam clean equipment at the docks to rid it of soil or plant material, and are generally responsible for inspecting exercise deployments. USDA may also provide a representative for large-scale, major exercise outloads, such as *Team Spirit* in Korea.

However, MCIs are not responsible for goods transported to Hawaii from the U.S. mainland, or vice versa. Much of this type of military cargo is consigned to commercial shippers for transportation, both in-bound and out-bound, and flows through normal commercial channels. The Navy Supply Center at Pearl Harbor generally handles nonpersonal military goods and equipment, while the Joint Personal Property-Shipping Office (JPPSO) is responsible for processing in-bound/out-bound household goods and automobiles between Hawaii and the mainland. Within JPPSO, the Personal Property Inspectors (PPIs) inspect shipments for compliance with pertinent shipping regulations and quality assurance.

Hawaii's eight PPIs work in two situations. In the first instance, they go to the house when personal property and goods from a military transfer are being unpacked to enforce the same federal and state laws that MCIs do on packouts. Roughly 50 percent of the total goods (as well as any brought to their attention by the movers who want to protect their equipment from infestations) are inspected.

In the second situation, PPIs serve as advisors and inspectors for packouts to the mainland. The main goal of the PPIs is to ensure that the military personnel get the moving service and standards the DOD paid for.

Resources

Typical for recent years, staff assigned to MCI within PACOM for the first quarter of FY91 include: officers (3 full-time, 22 part-time); enlisted personnel (497 full-time, 610 part-time); civilian (35 full-time, 34 part-time); and eight PPIs. There are also people with formal MCI duties in addition to their regular responsibilities. In addition to the PACOM coordinator, each service has its own customs coordinator.

5. U.S. Postal Service[24]

According to department records, during 1976 the Hawaii Department of Agriculture (HDOA) inspected a total of 18,806 first and second class parcels and intercepted 295 pests. In 1978, Congress placed restrictions on inspecting first-class domestic mail (USDA and Customs may still inspect all foreign mail), prohibiting state inspection of such parcels even if suspected of carrying agricultural and environmental products and pests. As a result, during 1986 HDOA inspected 4,120 second class parcels and made 68 interceptions—a decrease of about 80 percent in both inspections and interceptions.

In 1989, Congress passed the Agricultural Quarantine Enforcement Act, prohibiting the mailing of quarantined agricultural material and authorizing a trial interdiction program that allowed inspection of first-class domestic mail parcels leaving the State. Beginning May 1990, USDA inspectors screened first-class mail parcels at the Honolulu Post Office and identified those items that matched a profile of packages likely to contain prohibited agricultural products. USDA then had "Doc Watson," a trained "sniffer" dog, examine these packages. Inspectors held any suspicious packages and requested a federal warrant. Once the warrant was obtained, USDA opened the package in the presence of a postal employee.

During the 60-day pilot program, Doc Watson identified 220 suspicious packages. Inspectors obtained search warrants for and discovered illegal agricultural products in each of the suspected packages. In total, USDA confiscated 2,000 pounds of illegal produce and 74 damaging agricultural pests. The program was subsequently extended. By June 1991, USDA had intercepted 593 packages with 567 of these containing prohibited agricultural products.

This pilot program conducted by USDA-APHIS demonstrated that (1) trained dogs could accurately detect contraband packages; (2) inspectors could obtain federal search warrants with little delay; and (3) a large number of packages leaving Hawaii for mainland addresses contain undesirable organisms.[25] HDOA was not allowed to conduct a similar test of mainland mail bound *for* Hawaii.

While this program provided a system to protect mainland states from unwanted plants and pests in Hawaii, a similar process to protect Hawaii from unwanted mainland species has not developed. Current postal regulations continue to prohibit the opening or inspection of any first-class mail by state agricultural inspectors unless the parcel is plainly marked by the sender as containing a plant or plant product on the federally-approved list of plants subject to quarantine in Hawaii. Furthermore, under existing regulations, HDOA inspectors cannot be

forwarded nor can they open any express mail or first-class packages obviously containing agricultural products, or even packages endorsed by the sender, "May be Opened for Examination."[25] However, as a result of the pilot program, Senator Akaka is drafting a bill that would allow Hawaii to use the detector dogs/search warrants technique on first-class mail entering Hawaii.

Despite these restrictions, Hawaii inspectors and the postal service continue to work closely to intercept unauthorized plants and plant products mailed into the State. Federal Express, DHL and other private mail/parcel carriers are very cooperative with HDOA and will call the HDOA-Plant Quarantine Branch (PQ) when they encounter a suspicious parcel.[27] Inspectors will use beagles to check the packages and deny entry of prohibited plants and infested commodities. The post office will then return the rejected parcel to the sender. Between October 1987 and June 1990, HDOA plant quarantine inspectors, with the cooperation of the local postal service, intercepted a total of 1,944 first-class mail parcels of plants and animals illegally entering the State through a single neighbor island post office.[28] However, in June 1990, the Postal Service terminated the program. (Efforts to obtain information regarding how these inspections were carried out and why the program was terminated were not successful.)

In addition, the USPS Honolulu Division is informing its employees of the quarantine requirements through employee "stand-up" talks and articles in postal newsletters, and the division includes the topic of quarantined items in Postal Service training courses on prohibited mailings. USPS staff also question customers who are mailing parcels suspected of containing fruits or vegetables, and refer mailer inquiries about quarantined agricultural goods to USDA. USPS, in a joint effort with the USDA, also published and mailed informational flyers regarding quarantine restrictions to 150,000 Hawaii households. Fines and/or imprisonment penalties are based on USFWS-LE and USDA-APHIS statutes and regulations.

6. U.S. Food and Drug Administration (Department of Health and Human Services)[29]

The U.S. Food and Drug Administration (FDA) is responsible for ensuring that all food imported into and within the United States is wholesome and free of filth. FDA has two to three inspectors stationed in Hawaii, with at least one full time position devoted to inspecting only foreign imports. While FDA staff inspect a sampling of all foreign foods, for food manufactured domestically, mainland FDA offices conduct inspections and then ship the foods directly to Hawaii retailers and outlets. The food is not re-inspected once it reaches the State.

FDA does not have a specific program for preventing alien pests from entering Hawaii. According to the administration, very few instances involve live infestations; 90-99 percent of the food that FDA finds to be contaminated is infested with either dead insects or insect parts.

7. U.S. Public Health Service (Department of Health and Human Services)[30]

During the 1970s, the U.S. Public Health Service (PHS) conducted inspections and insecticide spraying of aircraft arriving in Hawaii in an effort to prevent the introduction of new disease vectors (primarily flying insects) to the U.S. Spot inspections of aircraft were carried out by Hawaii Department of Health, Vector Control Branch personnel. Although inspections focused on foreign arrivals, some domestic flights were also included. Spraying was done on any aircraft where live insects were detected.

Vector control staff collected all dead insects in light fixtures and cargo holders of inspected aircraft. These were identified and retained in a reference collection. Insects collected included 130 species of mosquitoes.

This program was discontinued in the late 1970s. The authors were unable to obtain further information from PHS about the program or why it was terminated.

B. STATE AGENCIES

Compared to federal agencies, state agencies have a larger responsibility for the prevention of noxious pest introductions that may be damaging to Hawaii. State agencies assume most of the task of preventing U.S. mainland pests (and mainland nonpest organisms which may be pests in Hawaii) from reaching the State. Also, because of Hawaii's tropical environment, the State is vulnerable to far more foreign pests than the typical mainland state. State agencies must therefore, be involved in foreign traffic inspection or rely on being called in by their federal colleagues to prevent introductions of pests that pose a threat to Hawaii but may not be prohibited in the U.S. by federal laws or rules. Similarly, state inspectors will involve federal agencies if a detected organism is an endangered species and subject to provisions of CITES (in which case USFWS-LE is part of the process) or other federal restrictions. (Refer to Appendix B for the enabling legislation governing the following state agencies.)

Hawaii Department of Agriculture

Generally, Hawaii's Department of Agriculture (HDOA) has sole responsibility for species importation originating within the U.S. Its authority however, extends only to materials coming from the continental U.S. It therefore, relies heavily on referrals from U.S. Customs, USDA-PPQ, and USFWS-LE to intercept foreign and trust territory items prohibited by the State.

The Hawaii Board of Agriculture (BOA) is responsible for establishing the broad operating policies of HDOA. The ten-member, governor-appointed board is also responsible for enforcing the list of species prohibited by statute and determining which additional plant and animal species are prohibited from or permitted into the State.

From 1973 to 1990, HDOA was required to designate by administrative rules, any restricted "articles" (including, but not limited to, fungi, bacteria, viruses or living insects) that would require a permit in advance of importation. In addition, the statute specified prohibition of entry to soil, any article with soil adhering, and certain specific animals and insects (some with specified exemptions), and directed BOA to maintain either a list of plants and animals that may be imported into the State or a list of plants and animals prohibited from entry into the State.

In 1990, the Legislature amended the law, directing BOA to maintain three lists for animals and micro-organisms: "conditionally approved" (permit required for importation); "restricted" (permit required for both importation and possession); and "prohibited." The amendment makes clear that an animal or micro-organism not on the first two lists is also prohibited. Any violation of permits issued for restricted or conditionally approved organisms is a violation of law.

The statute requires that these permits be issued pursuant to rules. HDOA, in consultation with the Hawaii Department of the Attorney General, included the three lists as part of the administrative rules establishing the department's permitting process. Thus, under existing rule making procedures prescribed by the Hawaii Administrative Practices Act, whenever the lists are revised, they must go through public notice, hearing and comment.

Following a public rule making process in 1991 and BOA approval in January 1992, revisions to the "Non-Domestic Animal and Micro-organism Import Rules" were signed by the Governor in March 1992. HDOA-Plant Quarantine Branch (PQ), described in this chapter, developed the proposed rules by reviewing records of previous BOA decisions, and incorporating recommendations from researchers, private industry, staff and public hearing comments.

In addition to the animal and micro-organism lists, the legislature required two plant lists: one for species that may be imported with a permit and one for those that are prohibited. However, unlike animals or micro-organisms, there is no statutory language which states that plants must be on the permitted list or they cannot be imported. PQ staff plans to base the initial plant lists on the up-dated noxious weeds and seed rules,[31] and follow-up with a review by environmental and horticultural groups, and advisory subcommittees (refer to HDOA-Plant Quarantine Branch). The resulting lists will then go through the same administrative rule process and must be approved by BOA before they are in force.

1. Plant Quarantine Branch, Plant Industry Division (Hawaii Department of Agriculture)[32]

The Plant Quarantine Branch (PQ) regulates the importation and movement within the islands of all plants and nondomestic animals (vertebrate and invertebrate).[33] Its primary goal is to prevent the introduction of harmful insects, plant diseases,

illegal animals and other pests into Hawaii. PQ also provides clearance for exporting horticultural products from the State (e.g., "rooted" plants) and will sometimes inspect cut flowers and foliage if USDA is overburdened.

Species Permit Application Process

To prevent introductions of pest species, HDOA has developed a required permit process involving technical review and BOA approval. All individuals requesting to import any plant or animal species must file an application with HDOA's Plant Quarantine Branch. If an applicant is requesting to import an animal or micro-organism that is not on the conditionally approved or restricted list, a revision must be made to the appropriate list before it may be imported. All revisions to the animal and micro-organism list must go through the administrative rule making process. Since these provisions are not specified for the plant list, plants not on the permitted or prohibited list are not required to go through this process.

If the request is for a species that is on an animal or micro-organism list and has received prior approval by BOA or is a plant that has received such approval, PQ can issue the permit. If, however, an applicant is requesting a permit for a species that has not received prior BOA approval, PQ will conduct a three-tiered review process to bring the request before the board.

First, the application is submitted to BOA's Technical Advisory Subcommittees. The five subcommittees (Land Vertebrates, Invertebrates and Aquatic Biota, Entomology, Micro-organisms, and Plants) are composed of researchers, industry representatives and government officials. The subcommittees evaluate the application along technical/scientific lines, particularly for the organism's potential impact. The subcommittees then pass their analyses to the Plant and Animals Advisory Committees which considers the application and the subcommittee findings from a broad perspective, weighing the potential harmful impacts against potential benefits. BOA then reviews the Advisory Committees' recommendation and issues the final decision on the application.

BOA may impose permit conditions, such as cage requirements or limitations on breeding or sale of the organism. If an animal is listed §4-71-7, Hawaii Administrative Rules, as requiring a bond, it will either be in the amount of $250, if the importer has a USDA license for the animal under the federal Animal Welfare Act, or $1,000.[34] (PQ also inspects and approves safeguarded facilities—e.g., laboratories—of applicants before issuing permits for restricted organisms.)

Permitted Species Inspection Activities

Once a permit is issued, PQ will inspect and clear a new organism prior to its entry into the State. This inspection verifies that the species arriving in Hawaii is in fact the permitted species and that it does not carry any pests or diseases. PQ conducts port-of-entry inspections at BOA-designated ports. Presently, five maritime harbors (Hilo, Honolulu, Kahului, Kawaihae and Lihue) and four airports (Honolulu

International, Keahole, Kahului and Lihue) are primary port-of-entry inspection sites.

PQ inspectors may conduct follow-up (postentry) inspections to enforce any permit conditions. No data, however are available regarding the proportion of permits receiving such inspections. While PQ tries to conduct at least one inspection after a permit is issued, the number of postentry inspections is far fewer than the branch would like to see. (Refer to Chapter 4 for a fuller description of postentry activities.)

On-Site Inspection Process

In addition to inspecting permitted plants and animals for compliance with state regulations, PQ conducts on-site inspections of cargo and passengers entering Hawaii for plants and animals brought into the State without a permit. Inspections are conducted at the nine BOA-designated ports listed above.

Cargo

Shippers of domestic cargo bound for Hawaii by air or sea must notify HDOA of in-coming goods requiring inspection. If such freight arrives during nonworking hours, the shipping company must hold the cargo until the next business day to provide inspection officers adequate opportunity to examine it.

Low staffing levels relative to the large volume of goods entering the State do not allow for inspection of all cargo. Instead, the branch separates in-coming goods into one of three "risk categories"—high, medium or low risk—and randomly inspects the items in decreasing order of emphasis. For high risk goods, such as all animals (including fish) and all propagated plants, PQ will inspect 100 percent of the declared items. For items considered to be of medium and low risk, the branch will randomly inspect two or three boxes from a particular cargo lot. Medium risk goods include cut flowers and foliage, while produce is considered to be low risk. Stock feed, coffee beans, organic fertilizer and planting media fall along a continuum between medium and low risk. Lacking any prescribed method or basis for a statistical sampling process, the level of inspection devoted to these spot checks depends on the availability of inspectors.

Maritime inspections usually involve only "plant-related commodities" (e.g., produce with longer shelf life such as bananas and commodities such as planting media and organic fertilizer) while airport inspections are both plants and animals, as most fish and other seafood, animals and perishable produce or plants are air shipped. PQ inspects containerized freight (other than dry goods) and vehicles upon arrival; dry goods inspection was omitted many years ago because of staff shortages.

Passengers

All passengers, officers and crew members arriving in Hawaii by commercial aircraft or vessel and carrying plants, animals, microbial cultures, or soil[34] must complete the HDOA mandatory Declaration Form and submit the imported items for inspection. This is the only means the state currently has to make travelers from

the U.S. mainland aware of restrictions on what can be brought into the State, or to inspect and if necessary, seize prohibited items. Passengers arriving by private airplane or boat must also complete the declaration forms. When private boats arrive at any of the harbors they must report to the harbormaster (and, in the case of boats arriving from foreign ports, to Customs) who in turn directs them to PQ for inspection.

Airline passenger declaration forms were the sole basis for inspection of in-coming passenger baggage through 1989. Then, in late 1989, HDOA initiated a citation program and retained a small cadre of trained beagle dogs to inspect checked baggage. The citation of airlines that were derelict in passing out and collecting declaration forms in combination with the use of beagles resulted in a substantial increase in the number of passengers declaring agriculture items when entering the State. Between January 1990 and July 1991, PQ issued 165 citations to airlines, individuals and cargo haulers.

Persons importing illegal species into Hawaii have incurred monetary and/or imprisonment penalties since 1927, although importation statutes existed earlier. Initially, fines were $25-$100 with prison terms of up to six months for violations of import procedures or illegal importation. By 1991, fines ranged from ≤ $500 with a prison term of ≤ 30 days (for airlines etc., that fail to distribute, collect or submit declaration forms) to $1,000-$10,000 with no prison term for more than one violation within five years or lack of permit for prohibited or restricted organisms. In 1992, the law was again revised, providing for penalties from $100-$25,000 and imprisonment for 30 days to one year (see Appendix C for changes in penalties over time).

Since the penalty section's revisions in 1985, an amnesty provision exempts from penalties persons who voluntarily surrender, prior to the beginning of any seizure action, a prohibited animal or a restricted animal for which they have no permit.

Military

Military maritime and airport facilities are subject to PQ inspection, but such inspections are limited due to the lack of staff. PQ is currently establishing cooperative agreements with military bases that will clarify each agency's inspection and interception responsibilities. The branch has already signed an agreement with Hickam Air Force Base. In addition, PQ has assigned one supervisor full-time responsibility for coordination with military bases.

Resources

In FY91, PQ staff numbered 65 people with expenditures of $2,132,091. (These figures contrast with the 1989 levels of 49.5 staff members and a budget of $1,425,324 and represent a "shift to support pest prevention.")[36]

2. Plant Pest Control Branch, Plant Industry Division (Hawaii Department of Agriculture)

The Plant Pest Control Branch (PPC) primarily concentrates on control functions described in Chapter 4. However, PPC plays a lead role in carrying out the department's responsibility to develop lists of noxious seeds and noxious weeds that are subject to regulation. The former contains a list of noxious plants whose seeds are prohibited (or allowed in only minimum concentrations) in agricultural or vegetable seeds sold or offered for sale for sowing purposes within the State. The administrative rule containing this list has been under revision for nearly ten years. However, public hearings on proposed revisions to this rule and the noxious weed rule were conducted in March and April 1992. Two amendments proposed in the noxious seed rule should help clarify and make it consistent by: (1) replacing undefined terms "noxious weed", "primary noxious weed" and "secondary noxious weed" with defined terms, "restricted noxious weed seed" (entry with conditions) and "prohibited noxious weed seed" (no entry); and (2) ensuring that any weed declared noxious in the noxious weed rule is also listed as a prohibited noxious weed seed.

The noxious weed rule establishes criteria for designating plant species for the purpose of control and eradication, and procedures for such projects by HDOA. There are five designation criteria: (1) characteristics of growth; (2) characteristics of reproduction; (3) detrimental effects; (4) techniques required for control; and (5) current distribution and spread. Restricted weed species may include weeds that are common in some parts of the State but prohibited from other, uninfested areas. For example, fountaingrass is a well established weed only on the island of Hawaii, so movement of its seeds or other propagative parts to designated free areas is prohibited.

Resources

Staffing and budget of PPC are described in Chapter 4.

3. Inspection and Quarantine Branch, Animal Industry Division (Hawaii Department of Agriculture)[37]

By rule, the Inspection and Quarantine Branch (IQB) of HDOA's Animal Industry Division focuses on cats, dogs and other carnivores, and has authority to inspect all such animals legally entering the State through any port or airport. Its animal quarantine station places particular emphasis on keeping Hawaii free of rabies.

As with plants, arriving carriers are responsible for notifying Hawaii authorities of animals on board. Unlike plants, however, the carriers' local managers or agents are responsible for these notifications. Animals arriving on vessels en route to destinations outside of Hawaii are allowed to remain on the vessel under confinement after notification to IQB. If the vessel will be in port over 72 hours, the animal must be held at the quarantine facility until the vessel leaves the State. The branch also maintains

a holding facility at Honolulu Airport for animals in transit through the State. In 1992, this branch was reorganized into two branches—Animal Quarantine Branch and Inspection and Enforcement Branch. This reorganization reflects additional emphasis on enforcement activities.

Quarantine and Inspection Activities

IQB will inspect and clear permitted, domestic carnivores prior to their entry into the State. This inspection verifies that the animal arriving in Hawaii is in fact a permitted species and that it does not carry any pests or diseases. In addition to this inspection process, all carnivores (other than those from rabies-free Australia, New Zealand, the British Isles and the Territory of Guam) destined for Hawaii must undergo a mandatory, minimum 120-day quarantine in the state's quarantine facility at Halawa Valley, Oahu. Animal owners are responsible for the cost of care during quarantine plus a registration fee. Other mammals are generally issued a "lifetime quarantine" and must remain only at a specific place—e.g., the Honolulu Zoo, Sea Life Park.[38]

Similar to PQ, the branch has authority to inspect military air and sea transport. Again, like PQ, staff limitations prevent it from doing so.

IQB has substantially increased its enforcement actions in recent years. A comparison of FY79-FY83 with FY84-FY89 shows an increase of 1,091 percent in citations issued; 5,542 percent in fines collected; 1,457 percent in written warnings issued; and 1,648 percent in refused entries. IQB fines and penalties are based on Chapter 142, Hawaii Revised Statutes (HRS). Violations are misdemeanors except when they occur more than three times in one year or are considered a serious threat to the health of the State, in which case they are felonies. Penalties are fines and/or imprisonment.

Resources

In FY91 IQB staff numbered 63 persons, most of whom were assigned to the quarantine facility. Branch expenditures for that year totaled $2,230,171.[39]

4. Livestock Disease Control Branch, Animal Industry Division (Hawaii Department of Agriculture)[40]

The mission of the Livestock Disease Control Branch (LDC) is prevention, control and eradication of diseases of livestock and poultry in Hawaii. Prevention is conducted through disease surveillance activities, which includes enforcing livestock import regulations. These regulations are designed to detect and prevent entry of animals carrying such diseases as tuberculosis and anaplasmosis (cattle), pseudorabies (swine) and brucellosis (both cattle and swine). The goal of this program is to ensure that the State remains free of such diseases, which in turn makes it easier to export livestock. LDC fines and penalties are based on Chapter 142, Hawaii Revised Statutes (HRS).

Inspection Activities

LDC has inspection requirements for domestic livestock, poultry and nondomestic animals imported to the State. Import requirements vary depending on the species. Except for those described below, no statistics on sampling proportions are available.

To prevent the importation of diseased livestock and poultry, shippers must meet the state's importation requirements. One requirement shared by all states is the interstate health certificate that must be issued by a USDA-accredited veterinarian[41] or state or federal veterinary officer, certifying that the animals being shipped are free from external parasites and symptoms of transmissible disease. All other information and test results required for entry into the State must also accompany the certificate, including counter-signing by the exporting State Veterinarian, when necessary. Other cooperative/shared arrangements among the states and USDA include USDA-certification of state-certified labs; confirmation testing conducted at a USDA lab in Ames, Iowa; and data sharing with the USDA's Colorado database.

Cull cows and bulls are inspected for tuberculosis and other diseases at division-inspected slaughter plants throughout the State. Blood samples collected at slaughter are tested for brucellosis, anaplasmosis and other diseases at the division's veterinary laboratory. All sows and boars are similarly tested for swine brucellosis and pseudorabies.

Monitoring of livestock within the State varies depending, for the most part, on whether the animal is quarantined. If quarantined, LDC will issue a "permit to move," allowing movement to slaughter or another approved quarantine zone. If the animal is not under quarantine, LDC relies on its "Certificate of Livestock Ownership/Movement," a legal document transferring ownership of an animal. Certificates are self-issued by the owners and copies are required to be forwarded to the State Veterinarian.

Special Projects and Task Forces

State-Federal-Industry Pseudorabies Control and Eradication Program

In 1990, the state's swine industry joined the rest of the nation in a program to eliminate pseudorabies infections from all domestic swine farms through the "State-Federal-Industry Pseudorabies Control and Eradication Program." Under the Program, states are placed in one of five disease control "stages" with Stage Five achieved once a state is free of disease for a specified period of time. Hawaii is currently in Stage Two—Control. The goals of this stage are to determine which herds are infected with pseudorabies and begin herd clean-ups. Besides surveillance testing conducted on all sows and boars at slaughter, the state randomly samples 25 percent of all farms in the State each year for pseudorabies and swine brucellosis. To support these efforts, a quarantine of all feral swine statewide is currently in effect.

Resources

In FY91, the branch had 8.9 staff members and expended $395,829.[42] Approximately 50 percent of these funds are used to prevent the introduction or reintroduction of livestock and poultry diseases and parasites not found in Hawaii. Another 40 percent is used to control and eradicate diseases occurring in the state's livestock and poultry. The remaining 10 percent is used for other livestock disease control-related programs.[43]

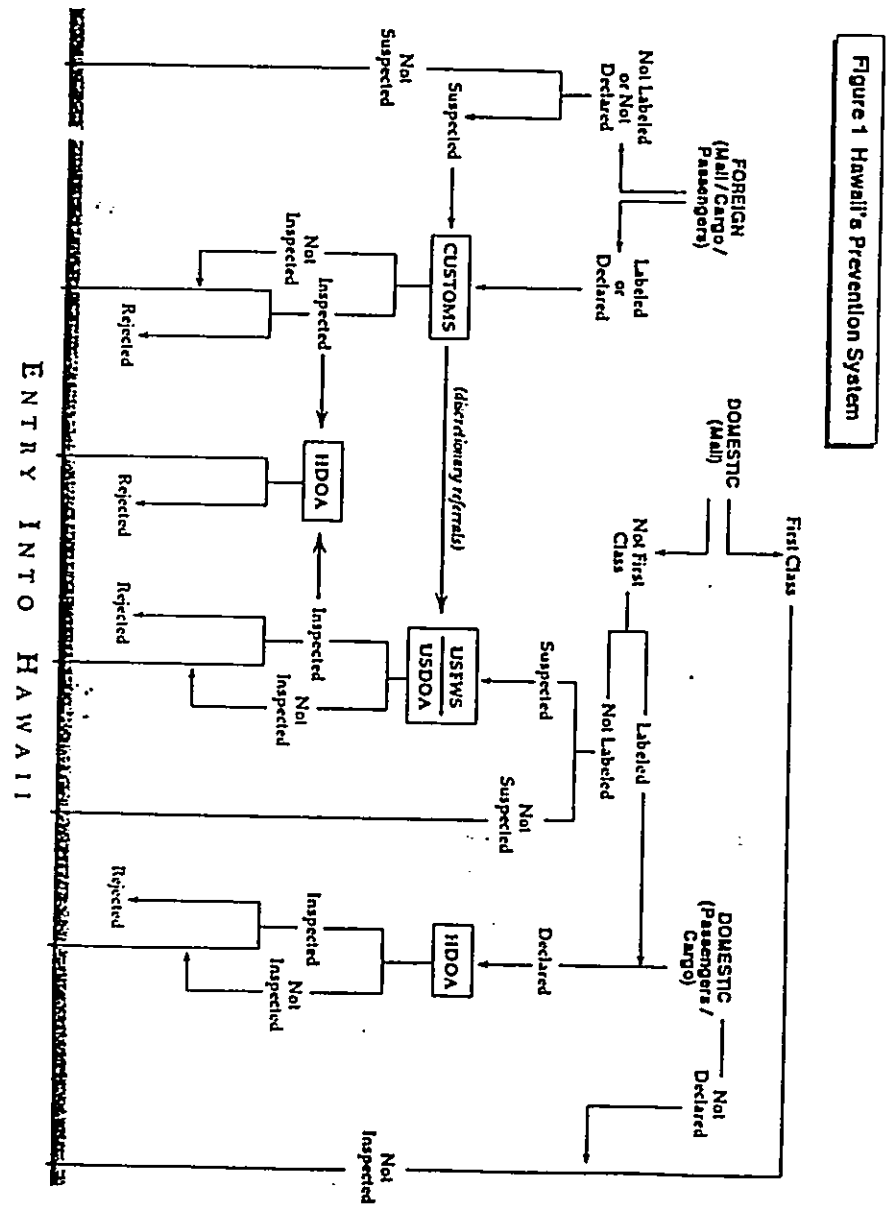
C. INTERACTION OF THESE AGENCIES

People arriving in Hawaii from foreign countries must pass through several check-points before they are officially cleared for entry into the State. The first stop for both airline and cruise ship passengers is U.S. Immigration. The Immigration Service checks visas and other travel documents, but does not inspect baggage or other personal belongings. Following Immigration, the U.S. Customs Service will inspect all declared or suspected baggage, mail and individuals from foreign countries. If Customs officials discover any plants, plant materials, insects, or certain types of animal products, they will refer the individual to USDA-APHIS and/or the USFWS-LE for further inspection. Federal inspectors will also notify HDOA on a discretionary basis.

Domestic cargo, passengers and mail are not subject to the same entry restrictions. Although HDOA has primary inspection responsibilities, its inspectors can only search those goods identified on shipping logs or passenger declaration forms. If applicable, HDOA will refer inspected items to USFWS-LE for its review.

Generally, under existing federal statutes, postal officials and state agriculture personnel may not inspect first-class mail entering Hawaii from the mainland. U.S. Postal Service employees may notify USDA-APHIS and/or USFWS-LE when they suspect non-first-class mail to contain illegal plants and animals. If the intercepted item is allowed under federal law but the USDA or USFWS suspect that it is prohibited under state law, the federal agency will notify HDOA. In addition, postal employees will notify HDOA of any mail that is plainly marked by the sender to contain a plant or plant product on the federally-approved list of prohibited, "noxious" weeds. In addition, Federal Express, DHL and other private carriers will sometimes contact HDOA directly when they encounter suspicious parcels.

Figure 1 illustrates Hawaii's prevention system.



D. TASK FORCES AND OTHER GROUPS WORKING ON PEST PREVENTION

This section briefly describes some of the other private or government organizations, task forces and committees working on alien pest prevention.

1. Brown Tree Snake Control Group[44]

Founded in 1990 by five scientists and a veteran government official, the Brown Tree Snake Control Group (BTSCG) was organized in response to the increasing alarm over Guam's brown tree snake infestation and the perceived threat of this snake becoming established in Hawaii. The Group reported to the 1990 State Legislature and helped initiate House and Senate Resolutions. In July 1991, the Hawaiian Electric Company donated a $37,000 research grant to BTSCG. The grant will be used to help those agencies involved in prevention activities by identifying their various roles and analyzing detection and screening efforts. Following this evaluation, BTSCG will recommend administrative changes, emergency measures that may be needed, and state and federal legislation, to improve inspection and detection efforts.

2. Noxious Plants Task Force[45]

The Task Force was established by the Conservation Council of Hawaii (see below) to prepare testimony for the state noxious weed hearings. Specific topics that were addressed included: (1) identifying plants not listed that pose a threat to native ecosystems or agriculture; (2) eliminating discrepancies between seed and weed lists; (3) recommending additional statutory authority for DLNR to list noxious plants that are pests primarily on conservation lands; (4) recommending discretionary action on the part of the State to set priorities to eradicate, control or quarantine listed plants; and (5) proposing quick-response mechanisms for controlling or eradicating new noxious species that do not yet appear on the official list.

3. First-Class Mail Inspection Task Force[46]

Established by DOA in 1990, this task force was asked to examine how the department could obtain the necessary authority to inspect all classes of mail entering the State. Previous research established that prohibited plants, animals and their pests were able to enter Hawaii uninspected or without assurance that such material met the entry requirements of the state.

The task force established that: (1) USPS does not allow the state to inspect first-class mail entering Hawaii; (2) USPS and USDA have established a method using detection dogs, that allows inspection of all classes of mail leaving Hawaii for the continental U.S.; and (3) poultry entering the State through first-class mail frequently fail to meet Hawaii's entry requirements.

The task force recommended to DOA that congressional legislation be proposed, granting the state inspection authority for all classes of mail entering Hawaii. This proposed arrangement would be similar to those that were available to USDA during their pilot mail inspection program.

4. Educational Programs

A number of organizations are working to educate the public about risks from alien pest species. In addition to those listed here, the National Park Service, DLNR-Division of Forestry and Wildlife, DOA and other government agencies include alien pest information in their public education programs.

Alien Species Alert Program (ASAP), National Audubon Society, Hawaii State Office[47]
This is a two-year, multimedia educational campaign aimed at reducing pest introductions through public awareness. Initiatives include distributing 50,000 educational brochures, presenting slide shows and exhibiting ASAP displays across the State, and publishing bimonthly articles on alien species for the National Audubon's Hawaii newsletter, *Greenprint*. The Society assisted HDOA and other organizations to produce (with HDOA and Hawaii Visitors Bureau funding) an in-flight video for Hawaii-bound flights to inform passengers about the importance of preventing unwanted pest introductions. Other recent initiatives include conducting Brown Tree Snake workshops in conjunction with USFWS for Hawaiian Electric linesmen and preparing written testimony for Senate hearings in Washington, D.C. In addition, ASAP assisted the Noxious Plants Task Force in its preparation for the state's noxious weed hearings. In cooperation with Hawaii Audubon, ASAP is also offering *"Paradise Pursuits,"* an environmental quiz show for Hawaii's high school students in 1992, with alien species as one of the four main topic areas. Playoffs will be broadcast statewide on KHNL-TV.

Moanalua Gardens Foundation[48]
The Moanalua Gardens Foundation (MGF) is a nonprofit organization that fosters cultural and environmental awareness and appreciation for Hawaii's unique resources. MGF has developed a "human impact" slide presentation, identifying the negative effects of alien species in the environment; and a children's video, *In the Middle of the Sea*, that features tropical, insular evolution of plants and animal species. MGF staff presents illustrated lectures in the classroom (principally fourth to sixth graders) on the evolution of Hawaii's biota and the threats to it. MGF also sponsors field trips and interpretive walks, pointing out native and alien species, and conducts service trips to help eradicate alien species.

In addition, *The Ohia Project*, cosponsored by MGF and the Bishop Museum, addresses the alien species problem in elementary and intermediate school curricula. As part of the project, MGF produced a video, *We All Need the Forest*, that includes a section on introduced plants (banana poka) and animals (pigs). The project also provides background information and suggests several activities for teachers.

The Bernice Pauahi Bishop Museum
The Bernice Pauahi Bishop Museum educates the public about alien and native species through its exhibits, public programs and curriculum development. The museum and Moanalua Gardens Foundation have collaborated through the *Ohia Project* to develop Hawaii-oriented environmental education curricula for secondary schools. (Other alien species-related functions of the Museum are described in the next chapter)

The Hawaii Nature Center
The Hawaii Nature Center provides a wide range of environmental education programs for younger children and families on Oahu and, soon, on Maui. The Center focuses on building awareness of the basic characteristics of nature and a stewardship ethic among young people, reaching thousands of children each year.

The Nature Conservancy of Hawaii
The Nature Conservancy of Hawaii (TNCH) has published a popular book on native ecosystems highlighting the threat of alien pests that has given rise to two popular films on the subject by National Geographic and IMAX. TNCH staff also work with government agencies, elected officials and private businesses and landowners to promote conservation programs.

Conservation Council for Hawaii
The Conservation Council for Hawaii (CCH) produces an annual educational packet for Hawaii teachers featuring some aspect of native ecology and conservation, and has been an active source of information on alien species problems and proposed solutions for the Hawaii Legislature, U.S. Congress and the community at large. CCH also convened the Noxious Plant Task Force in preparation for the state's noxious weed hearings. CCH is an all-volunteer, nonprofit organization.

Chapter 4 Current Systems for Controlling Pests After They Enter Hawaii

This chapter describes the agencies and other groups involved in controlling pest species after they enter Hawaii, including both well established pests and new or "escaped" pests. While control is primarily the responsibility of state government, federal agencies also carry out control programs on federal lands, enforce federal endangered species laws and conduct research to improve control methods statewide. In addition, a few private agricultural and conservation organizations engage in research on control methods and implement control programs on their own property. Each of these state, federal and private organizations generally focuses on only one of three major areas of concern: agriculture, human health or native ecosystems. Although there is some overlap and coordination among these three major fields, the various organizations generally operate independently. The statutes and regulations governing the agencies described below are listed in Appendix B.

A. STATE AGENCIES

1. Plant Quarantine Branch, Plant Industry Division, (Hawaii Department of Agriculture)[48]

While the Plant Quarantine Branch (PQ) primarily focuses on preventing the introduction of harmful pests into Hawaii (described previously in Chapter 3), PQ also conducts "postentry" follow-up inspections to ensure that potentially harmful species authorized for entry under HDOA permits do not escape and become established.

Inspection Activities

PQ does not conduct follow-up inspections for all permits, nor does it schedule a regular series of inspections. While PQ has in the past tried to follow up on all conditional permits issued, since 1989, as a result of staff shortages, only restricted permits receive follow-up inspections. (Some restricted permits may be only for a short period of time—e.g., a circus performance—and would not be inspected.) PQ conducts annual follow-up inspections for all aquatic animal and micro-organism

facilities, and inspects 80-90 percent of the facilities with permits for other vertebrates. Few restricted permits are issued for plants. Those agencies and organizations that hold restricted permits tend to maintain and contain their animals well. As a result, violations or escapes of restricted permitted introductions are not major problems, and follow-up inspections resolve most of the problems that do occur.

According to the HDOA Annual Report, PQ received and filled five new staff positions and conducted 1,651 postentry inspections during 1990—an improvement over the previous year. However, no statistics are available regarding the *proportion* of permits receiving follow-up inspections. The branch is currently trying to computerize all permits and hopes to have this kind of data available in the future.

Control Activities

Any escaped organisms detected during inspections are destroyed or contained for removal by the PQ inspectors with assistance by specialists from other agencies, as required. If the inspector determines that the escaped organism is too well established for immediate containment, PQ turns the case over to another agency: HDOA's Plant Pest Control Branch (PPC) for established agricultural weeds, diseases, or invertebrate pests (e.g., insects, mollusks, etc.) and occasionally for vertebrate pests that threaten agriculture (e.g., prairie dogs on Kauai in the 1980s); or Hawaii Department of Land and Natural Resources' Division of Forestry and Wildlife (DOFAW) for any established vertebrate (e.g., birds, mammals, reptiles, etc.) or any weed, disease or invertebrate that is not regarded as a threat to agriculture but is a potential threat to conservation lands and fisheries.

In theory, PQ is not involved in control work that does not originate from a permitted introduction. Once a pest is "established" (e.g., widespread or reproducing in nature), control functions are the responsibility of the following agencies: PPC for most agricultural pests; DOFAW for most forest pests; or the Vector Control Branch of Hawaii Department of Health for rats and mosquitoes in urban areas. The *actual* division of responsibility, however, is not as clear as it seems or as agency personnel would like.

Problems arise primarily with established vertebrates. Although the law tasks PQ with the responsibility for species when they are entering the State, traditionally the branch is also involved in pursuing illegal species (e.g., snakes,[50] other reptiles, a cougar) long after they have left the importation system—airport, dock, warehouse or retail outlet—and are out in the wild. "Handing off" of responsibility to another agency generally only happens if the other controlling agency has been previously designated (for example, PPC will react to new *insect* discoveries not connected with a permitted introduction). If, however, the lines of responsibility are unclear, PQ is often the responding agency.

Contingency Planning

Currently, PQ's only contingency planning effort is for the brown tree snake (HDOA-Animal Industry Division has a contingency plan for rabies and another is being prepared by PPC for the Africanized honey bee). While contingency planning is considered useful, PQ's lack of resources prevents it from engaging in more of these efforts.

Resources

In FY91 PQ's total staff of 65 included 41 inspectors. An estimated 20 percent of the branch's efforts goes to export work, with the majority of its work focusing on incoming flora and fauna.

2. Plant Pest Control Branch, Plant Industry Division (Hawaii Department of Agriculture)[51]

The Plant Pest Control Branch (PPC) consists of two sections: Chemical/Mechanical Control and Biological Control. The branch is responsible for controlling established diseases, invertebrate pests, some vertebrates pests and noxious plant species (refer to Chapter 3 for a description of the official noxious weed and noxious seed lists). In addition, PPC has worked in recent years to lessen farmers' reliance on chemical pest control and encourage greater use of integrated pest management strategies. PPC fines and penalties are based on Chapter 141 and 150, HRS.

Survey and Control Activities

PPC's function is to apply plant pest control methods that have been developed in Hawaii or elsewhere. While PPC does not perform in-depth research, it will study research results, conduct some short-term research projects to devise or improve pest control methods and if applicable, implement new pest control methods.

PPC responds to all pest calls, including those reporting any animal, insect, disease agent or any other organism in any stage of development that is detrimental, or potentially harmful to agriculture, natural resources or the environment. During 1991, PPC received 234 pest calls.[52] About 20 of these calls required follow-up, onsite visits, with the remaining resolved over the telephone. The number of staff and/or staff hours responding to the calls varies, depending on the particular circumstance and problems uncovered. Within the last ten years, the number of pest calls has increased by about five percent each year.

<u>Chemical/Mechanical Control Section</u>

The control activities of PPC's Chemical/Mechanical Control Section (C/M) involve both direct actions by the Section and cooperative agreements with landowners and lessees. The Section's direct projects include work on:

- Oahu: banana bunchy top disease (East Oahu, Windward Oahu, Honolulu), papaya ringspot virus (entire island), turkeyberry (Waimanalo), bacterial wilt of heliconia (Waimanalo), fountain grass (Honolulu International Airport, lower Nuuanu);
- Hawaii: papaya ringspot virus (Hilo, Panaewa, Kona, Kohala), gorse (Mauna Kea), firetree (Hamakua), ivy-leaved gourd (Kona), European brown snail (Kamuela);
- Maui: fountain grass (Wailuku), turkeyberry (Iao Valley, Kahakuloa), bacterial wilt of heliconia (Haiku), European brown snail (Olinda, Kula);
- Kauai: maize chlorotic mottle virus (West Kauai).

Cooperative noxious weed control projects with landowners or lessees are normally for a period of five years and commit HDOA to provide technical expertise and herbicides, while the private party provides equipment and labor. If the private party chooses not to renew after five years, the agreement binds the landowner to keep the infestation at the occurrence level achieved at the end of the five-year period for another five years. Current agreements include projects on gorse and turkeyberry control. Until recently, landowners were not required to participate. In 1992, however, an amendment was passed that now allows HDOA to enter private property, with or without the landowner's or lessee's cooperation and to charge the appropriate party for the cost of eradication.

<u>Biological Control Section</u>

Hawaii has played a pioneering role since 1890 in the science of biological control: the suppression of pest populations by introduction and liberation of natural enemies.[53] Over 691 species have been purposely introduced and released in Hawaii for biological control, with at least six documented cases where these organisms became pests themselves.[54]

PPC's Biological Control Section (BC) uses the classical biological control technique—"the importation and release of an organism outside its natural range for the purpose of controlling a pest species."[55] The section uses techniques reported in the current literature as well as those developed within BC to improve control methods. Most of the research conducted within the section is in host specificity testing of foreign natural enemies for biological control. A majority of the work is on biological control of alien insect pests of plants, although some weeds are also targets for biological control. Control of the invasive weed *Coccinia grandis* is an example of a new biocontrol project that BC has started to work on. The section has a full-time exploratory entomologist, a survey entomologist, an assistant survey/exploratory entomologist, an insect taxonomist, four insectary entomologists and a plant pathologist.

As part of their routine activities, branch personnel on Oahu and the neighbor islands will survey their respective islands for weeds, diseases, insects and other

plant pests (Hilo-based staff make it a point to travel to Kona at least once every month to conduct their monitoring activities. One C/M staff member is also based in Kona). C/M staff members concentrate their efforts on weeds and diseases while BC focuses on invertebrate pests. As a supplement to these routine surveys, the BC's survey entomologist generally averages two to three days per quarter on each island, (1) investigating invertebrate pests on the pest priority list; (2) examining and delineating new pest records; (3) conducting detection surveys for pests not known to occur on a particular island; (4) investigating significant pest activity and (5) investigating weeds and diseases on an as-needed basis. If pests or diseases are identified, PPC will try to prevent establishment by eradication where feasible, and by control activities where infestation has become widespread.

BC's taxonomy unit provides insect identification services for PPC staff and other state, federal and private control agencies. The staff taxonomist relies on his reference collections and specialists at the Bishop Museum, University of Hawaii and other institutions for this purpose. The insectary supervisor manages a quarantine insectary (to test the specificity of insects to insect or mite pests or weeds), propagation insectary (to increase the number of insects prior to release for control of insects, mites or weeds), and a plant pathology quarantine laboratory. This laboratory was recently certified by USDA-APHIS and will eventually be used to evaluate plant pathogens (primarily fungi) for their use as potential biological control agents. Initially, the section will use the facility to study pathogens that can be used to control blackberry, firetree and gorse.

Special Projects and Task Forces

Six-Party Memorandum of Agreement

Although the primary purpose of the branch's activities is to promote agriculture, the statutory definition of "noxious weed" extends PPC's jurisdiction to include weeds that threaten forest and conservation lands. PPC represents HDOA in a six-party memorandum of agreement (MOA) that focuses on biological control of forest weed pests.[56] This MOA allows federal and state agencies to work cooperatively and enables USFS' biological control programs in Hawaii Volcanoes National Park. The parties meet in a steering committee at least twice a year to review research progress and coordinate plans. Projects are currently underway for gorse, banana poka and firetree, while exploratory work has also been conducted on Himalayan raspberry, fountain grass, miconia and cane tibouchina.[57]

PANIC Committee

The Planned Action for New Insect Control (PANIC) Committee is an ad hoc committee represented by various state and federal agencies and private industry. Members meet as necessary to share and discuss all available information regarding a newly arrived pest. The goal of the committee is to recommend control options.

Initially, the Taxonomy and Survey Units of HDOA-PPC will prepare a preliminary assessment on any insect or mite new to Hawaii, identifying specific characteristics, including its distribution, biology, host range and availability of natural enemies. PPC will then make a preliminary decision on how to handle a particular pest.

Committee meetings are ad hoc gatherings and will be held if these PPC investigations reveal the possibility of a particular arthropod becoming a major pest. Meetings will also convene if other agencies need information (e.g., pesticide testing by UH-Entomology), industry cooperation or if an interisland quarantine is necessary.

The Committee may recommend: (1) attempting eradication of the pest using existing methods (Chemical/Mechanical Section); (2) investigating biocontrol possibilities (Biocontrol Section); (3) investigating use of new pesticide control methods (UH-Entomology, Chemical/Mechanical Section, Pesticides Branch); or (4) monitoring the situation in lieu of immediate control action.

Resources

In FY91 PPC had 52 staff members and expended $1,774,540.[58]

3. Division of Forestry and Wildlife (Hawaii Department of Land and Natural Resources)[59]

The Division of Forestry and Wildlife (DOFAW) is responsible for natural resource programs on roughly 800,000 acres of state-owned land in Hawaii (about one-half of all forested lands in the State) and game management areas. The division is also involved in cooperative projects on certain agriculturally-zoned lands used for forestry, timber production or outdoor recreation, as well as in wildfire suppression in virtually all off-road areas outside federal lands. DOFAW fines and penalties are based on Chapters 183D and 195D, HRS.

DOFAW has the dual mandate of protecting native ecosystems and forest resources while also ensuring sustainable sport hunting of non-native game animals. Although introductions of new game animals to enhance hunting opportunities were supported during the 1950s and 1960s, DOFAW is now working to control feral mammals in sensitive watersheds and native ecosystems and manage degraded native or non-native habitats as sustainable hunting areas.

Founded in 1903 to respond to widespread forest and watershed damage by non-native livestock, the division is now the seventh largest state forestry operation in the U.S. in terms of acreage under its jurisdiction (it is 38th in terms of permanent staffing and 45th in funding). In addition, it is the only state program in the nation that combines forestry and wildlife functions under one agency. The division's field operations are largely administered by District Forest Managers, District Biologists, and their staff on Kauai, Oahu, Maui (for Maui, Molokai, Lanai, and Kahoolawe), and Hawaii Island.[60]

Generally, DOFAW is responsible for controlling pest species in conservation or nonagricultural lands while HDOA is responsible for agricultural pests. In many cases, however, this statutory distinction does not provide a clear jurisdictional boundary between the two agencies. The two agencies collaborate frequently, particularly when trying to control newly escaped species. HDOA-PQ is the first responding agency for escaped potential pests. Where necessary, PQ calls on DOFAW to assist with capturing or destroying escaped animals (especially vertebrates) and may ask DOFAW to accept primary responsibility for operations in remote areas where there is no HDOA staff.

Domesticated, nongame animals, such as chickens, ducks and rabbits, also present jurisdictional difficulties involving several agencies. Although DOFAW may respond to escapes or assist HDOA in handling them, jurisdiction over this class of potential pest is not clear. For example, although Animal Industry Division statutes provide some control over releasing domestic animals, no specific agency has jurisdiction over "feral rabbits."[61] The problem is further complicated when the animals in question are pets or farm animals valued by the owner. Feral animals in urban settings are often captured or destroyed by the island humane societies.

Control Activities

DOFAW is responsible for protecting all bird species occurring in a wild state, including alien birds. Anyone wishing to control a wild bird population must obtain a special permit from DOFAW. Some wild birds (e.g., chukars, pheasants, francolins) are declared "game birds" and regulated for sustainable sport hunting by DOFAW through game management seasons, bag limits and permits.

DOFAW also regulates the taking of alien animals declared as game mammals (feral pigs, goats, and sheep, axis deer, Mouflon sheep and black-tailed deer) by requiring hunting licenses of all hunters, setting seasons and bag limits on public hunting areas, and issuing permits for removal of such animals where they cause damage outside established hunting areas (e.g., in crop fields or urban gardens).

DOFAW has an active and expanding program of native ecosystem and endangered species protection, in which the majority of funds and labor are expended for pest control projects. Lands designated as state Natural Area Reserves (NARs), Wildlife or Plant Sanctuaries or Wilderness Preserves (currently about 30 sites totaling over 200,000 acres) receive priority for management. Major operations are also undertaken in other forest reserve lands.

DOFAW, with the support of private groups, has also taken the initiative on nonconservation and private lands in some cases where a serious pest threatens to expand into conservation lands (e.g., banana poka control project in Kula, Maui). DOFAW staff or contractors conduct aerial shooting, fencing, hunting and trapping programs for feral hoofed animals; wherever practical, they encourage public hunting as a complementary control effort. They also conduct chemical and

mechanical weed control and trapping, shooting and poisoning programs for mongoose, cats, rats and dogs in protected natural areas. Division personnel provide technical assistance to private landowners for controlling pests and participate in the interagency steering committee on biological control for forest weeds (see PPC above). DOFAW is also the leader of the Snake Watch Alert Program—SWAT—providing training and coordination for rapid response to snake reports, particularly in undeveloped areas throughout the State. Although DOFAW has several knowledgeable biologists on staff, the division has no significant research funding for pest control and relies largely on other agencies in this area.

Resources

In FY91, DOFAW staff responsible for pest control activities numbered 25 with expenditures of $2,811,601.[62]

4. Division of Aquatic Resources (Hawaii Department of Land and Natural Resources)[63]

The Division of Aquatic Resources (DAR) is responsible for conserving, protecting and enhancing the state's renewable resources of aquatic life and habitat; managing noncommercial use of these resources; promoting, developing and enhancing opportunities for public recreational fishing; managing commercial use of Hawaii's aquatic resources; and encouraging the growth and development of commercial fisheries and aquaculture in the State. The division is made up of three branches—Commercial Fisheries, Aquatic Resources and Environmental Protection, and Recreational Fisheries.

Control Activities

Although DAR has no regulatory authority for species imports, both the Aquatic Resources and Environmental Protection, and Recreational Fisheries branches are responsible for managing problems related to alien species. Through these two branches, DAR has a number of on-going projects, all of which are funded on a three-to-one (federal-to-state) matching basis. On-going projects include: freshwater habitat and species protection activities on Hawaii, Kauai, Maui, Molokai and Oahu; aquatic resources education programs; and freshwater fisheries research.

DAR has also initiated a high profile campaign against releasing aquarium fish into Hawaii's streams. Two projects are specifically targeted at the problem for the next five years: (1) Occurrence, Distribution and Abundance of Accidentally Introduced Freshwater Aquatic Organisms in Hawaii and (2) Investigations of the Impact of Accidentally Introduced Freshwater Aquatic Organisms and of Methods for Control or Eradication. These studies focus on (1) emphasizing the need to prevent new accidental introductions and (2) demonstrating that the serious aquatic problems that have exploded within the past decade are almost entirely the result of approved importations that have escaped and become established in the wild. Indeed, DAR

studies indicate that in aquatic habitats, control and eradication efforts are exercises in futility; once established, an alien species is probably here to stay.

Resources

It is difficult to fully assess relevant DAR costs because activities related to alien species prevention and control are incorporated in many projects. Total cost of the two projects described above for the five-year period are budgeted at $220,000 with $165,000 reimbursable from federal funding.

5. Vector Control Branch, Environmental Health Services Division (Hawaii Department of Health)[64]

The Vector Control Branch (VCB) is charged with preventing insect-borne disease outbreaks and relieving severe urban pest nuisances. The branch responds to public complaints, enforces public health regulations, conducts vector[65] population surveillance, controls pests in the field as well as in and around ports of entry, provides public education and consultation services, and conducts research on new methods of pest control. VCB fines and penalties are based on Chapter 322, HRS.

Control Activities

Branch personnel conduct detection programs under the International Sanitation Rules and provide protection against quarantinable diseases. These programs include cordon sanitation and mosquito light trapping. Cordon sanitation involves intensive rodenticiding and mosquito larvaciding at all major waterfronts (Nawiliwili, Port Allen, Honolulu, Kahului, Kawaihae, and Hilo) and airports (Lihue, Honolulu, Kahului, Keahole and Hilo). Rodent and mosquito trapping are also conducted to monitor the effectiveness of the control problem. The Hawaii Department of Transportation funds two positions to assist with this work in Honolulu. Any vector animal or insect caught by the branch are checked by the branch's laboratory for disease (e.g., plague, murine typhus, leptospirosis). Although the military services have their own program of cordon sanitation, the branch may provide advice.

Mosquito light traps are located on Oahu (59), Hawaii (24), Molokai (2), Maui (7) and Kauai (9). The "catch" is collected on the first working day of each week and is reviewed to determine both the population of night flying insects in the trapping area and any new mosquito or other vector species.

Vector Control prevents vector-borne diseases by keeping populations of potential vectors below disease transmission levels. It does this by responding to rat, insect or other vector animal complaints from the public and by direct control of chronic sources of mosquitoes, rodents and other vectors. The 1990-91 statistical summary is indicative of the control measures taken annually by the branch: mosquito breeding areas treated, 3,123 acres; rodents and mongooses trapped and tested for diseases, 8,459; households and businesses inspected during the course of responding to public vector complaints, 8,510.

The branch also cooperates with the department's epidemiology branch to isolate and control epidemics of vector-borne diseases. These operations are guided by contingency plans that outline procedures in the event of such an outbreak.

Resources

In FY91 the branch had a staff of 83 persons and a budget of $2,151,423.

B. FEDERAL AGENCIES

1. Animal Damage Control Program, Animal and Plant Health Inspection Service (U.S. Department of Agriculture)[66]

The Animal Damage Control Program's (ADC) mission is to resolve the problems created when wildlife cause damage to agricultural, urban or natural resources. Program staff provide technical advice and conduct wildlife control operations. Administrative costs are funded through the federal budget, while individual damage control projects are funded either through special congressional appropriations or through contract fees from private or agency clients.

Control Activities

Recent projects in Hawaii include wildlife hazard management activities at military and civilian airports to reduce collisions between wildlife and aircraft, a one year cooperative axis deer control project to protect the primary watershed and certain native plants on the island of Lanai, control of introduced gamebird depredations on crops on Molokai, urban nuisance bird (feral pigeon, introduced common mynah) control, suburban nuisance feral pig control, rat control and eradication operations on remote seabird refuges, public education to limit spread of introduced bird pests, control of introduced predators on endangered waterbird refuges, and rat and predator assessments in Natural Area Reserves.

ADC's operational program works closely with its research program, the Denver Wildlife Research Center (DWRC). A DWRC field station is located in Hilo where research is being conducted on developing rodent control methods in sugarcane and macadamia nut orchards, bird repellents for orchid crops, and habitat modifications to reduce the presence of birds on airfields.

Resources

Basic administrative funding for ADC in FY91 was $84,750 for one full-time and one part-time staff position. Contract revenues were several times larger than this and supported additional, temporary positions and trained volunteers.

2. Institute of Pacific Islands Forestry, U.S. Forest Service (U.S. Department of Agriculture)[67]

Although the U.S. Forest Service has no national forest land in Hawaii, it conducts research on Pacific Island forest management and ecology, and provides technical advice and training to Hawaii and other island forestry programs.

Control Activities

The service's Institute of Pacific Islands Forestry (IPIF) participates in a multiagency research effort to test methods for biological control of forest weeds at the quarantine insectary located in Hawaii Volcanoes National Park. (The six-party agreement supporting this research is described above under HDOA-PPC.) Funding for developing biological control agents for a particular target species comes from agencies and other parties impacted by that pest. Past target species include prickly pear cactus, clidemia, and common blackberry. Projects and programs are currently underway for gorse, banana poka and firetree, while exploratory work has also been conducted on Himalayan raspberry, fountain grass, miconia and cane tibouchina.[68]

IPIF also conducts research at Hakalau National Wildlife Refuge on restoration of native forests in former habitat that are now dominated by alien plants. Techniques developed through this forest management research program are intended to aid in long-term control of alien species in restored areas.

Resources

The FY91 budget for these components of IPIF's work was $544,000. Its nine-member staff is comprised of three scientists, four technicians, one biologist and one postdoctorate (a two-year, full-time position). Of the nine members, one resident entomologist, one technician and the postdoc are working on the Biocontrol of Forest Weeds Program.[69]

3. Tropical Fruit and Vegetable Research Laboratory, Agricultural Research Service (U.S. Department of Agriculture)[70]

The Agricultural Research Service (ARS) is the lead research agency of USDA. Within ARS, the Tropical Fruit and Vegetable Research Laboratory focuses its studies on four species of tropical fruit flies—the medfly, melon fly, oriental fruit fly and the newest invader, the solanaceous fruit fly. Scientists at the laboratory are developing new, safe and effective ways to detect, control and eradicate these fruit flies. The laboratory staff includes some 50 scientists, technicians and other support staff organized into three research units: (1) Rearing, Radiation and Genetics Research Unit; (2) Biology and Control Research Unit; and (3) Commodity Treatment, Handling and Distribution Research Unit.

ARS is currently conducting pilot research tests on the island of Kauai to evaluate the effectiveness of several methods in eliminating oriental fruit fly and Mediterranean fruit fly infestations in commercial plantings. Three pilot control programs are currently underway: (1) sterile medfly release in the coffee area between Koloa and

Hanapepe; (2) augmented parasitoid and sterile fly release in Kilauea and Kaneha Reservoir; and (3) integrated pest management in Moloaa. Results of the tests will be assessed to determine whether the various methodologies can be used in a statewide eradication program.

Elimination of the Mediterranean Fruit Fly by the Sterile Insect Technique

Initiated during 1990, this test consisted of monitoring existing fly populations to determine the preferred habitat using sentinel traps and releasing marked flies for recapture to estimate the size of the population. Mediterranean fruit flies were then reared in existing facilities in Honolulu, sterilized in an irradiator and shipped to Kauai as sterile pupae. The pupae were held in a facility located at Hanapepe and allowed to emerge as adults for release into the areas where the heaviest fruit fly populations occurred. The initial sterile insect releases were aimed at an overflooding ratio of 50 sterile flies to one wild fly and, if necessary, will be doubled to 100 sterile flies to one wild fly in order to achieve a downward trend in the wild fly population. Currently, about eight squares miles have been treated; ARS plans to expand the treatment area to cover about 50 square miles.

Augmented Parasitoid and Sterile Fly Release

Beginning in 1991, this test consists of weekly collections of fruit and monitoring of oriental fruit fly populations with lure traps. This provided baseline data on background populations before the parasitoid releases. Parasitized pupae, placed in plastic emergence containers in host trees, will be mass released at a rate of 250,000 each week. The initial release is scheduled for mid-April 1992. Following two years of parasitoid release, concurrent releases of both sterile males and parasitoids will begin. ARS anticipates five million sterile male adults to be released per week.

Integrated Pest Management

This test is being conducted to determine whether a combination of pest control methods can be used in creating an integrated pest management zone for control of melon flies and oriental fruit flies. The pilot test consists of the following pest control strategies:

- Field Sanitation: A farm management program is instituted, whereby abandoned papaya orchards are destroyed and all cull fruits are removed from fruit production areas. All ripe fruits are removed from fields each week. This phase was initiated in March 1989.
- Border Row Trap Plants: Three-foot-wide corn border rows are planted around each papaya orchard and subsequently sprayed with a protein material that attracts the flies and then a pesticide to destroy those flies that are attracted to the corn. The sprays are applied at two week intervals for one year. The corn is destroyed after completing its useful life and not used for human or animal food. This phase was initiated in October 1989.

- Male Annihilation Trapping: A trapping program is used to suppress male populations of the melon fly and oriental fruit fly. The traps are fabricated from plastic gallon containers with a wick containing a lure and an insecticide. The traps are suspended six feet above ground and distributed throughout the control zone. This phase was initiated in October 1990 and recently completed. Follow-up spot trappings may be conducted, if necessary.

- Parasite Releases: The final phase consists of releasing laboratory reared parasitic insects in vegetable fields and bordering wild guava areas. Release date will be scheduled at a later time.

4. U.S. Fish and Wildlife Service (U.S. Department of the Interior)[71]

The U.S. Fish and Wildlife Service (USFWS) is the primary federal agency responsible for protecting endangered species and wildlife in the U.S. In Hawaii, USFWS manages eight National Wildlife Refuges (NWR). Another six NWRs are scattered throughout the Pacific. Refuge areas include the Hawaiian Islands NWR (consisting of all uninhabited islands of the Northwestern Hawaiian Islands chain from Nihoa Island to Pearl and Hermes Reef), four small South Pacific island seabird reserves, two remote military overlay refuges, six wetland and coastal refuges for waterbirds and seabirds in the main Hawaiian islands, and the 16,000-acre Hakalau Forest NWR on the island of Hawaii. All NWRs are managed under the jurisdiction of the Hawaiian/Pacific Islands NWR Complex in Honolulu. Control of alien species consumes a large percentage of the complex's budget.

Control Activities

Refuge staff carry out control operations that are directed at the full range of major natural area pests in Hawaii: rats, cats, mongoose and other non-native predators; weeds in coastal, remote island and upland forest settings; ants and other invertebrate invaders of remote islands; and hoofed animals (feral pigs and cattle) at Hakalau. USFWS also contracts with ADC for pest control work on some refuges.

Research Activities

The service conducts research through its Mauna Loa Research Station. The research focuses on the biology of native forest birds, with an emphasis on understanding factors affecting their survival. These studies produce information on the range, habits and impacts of alien species in native ecosystems, and provide valuable background for other groups' work on control methods. Similarly, research and field work directed at native species on coastal refuges have produced information on the biology of alien pests. USFWS has recently initiated research on avian diseases affecting native forest birds.

Resources

For FY91, the USFWS refuges on Hawaii, Kauai, Oahu and in the Northwest Hawaiian Islands devoted $901,500 (of a total budget of $2,035,000) and the equivalent

of eight full-time staff persons (of total staff of 27) to management activities for the control and/or eradication of alien pest species.[72]

5. National Park Service (U.S. Department of the Interior)[73]

The National Park Service (NPS) manages four parks in Hawaii in which alien pest control is a major program component: Hawaii Volcanoes, Haleakala, Kalaupapa, and Kaloko-Honokohau—a total combined area of about 256,000 acres.

Control Activities

Hawaii Volcanoes National Park (HAVO): Beginning in the early 1970s, HAVO initiated ambitious and large-scale feral animal and weed control programs that have served as models for similar work by other federal, state and private managers. HAVO staff also carry out control projects for yellow-jackets, mongoose and other mammalian predators. With a FY91 resource management budget of $763,000 covering 16 positions and operations, HAVO has the most highly developed pest control program among the major refuges in Hawaii.

Haleakala National Park (HALE):[74] Operations focus on feral animal control, which includes fence maintenance/replacement and feral animal removal. Other priority projects funded primarily through "add-on" or nonpermanent funds include alien plant control, endangered ground-nesting bird species monitoring, yellow-jacket control and air quality monitoring. The park's FY91 resource management base budget of $221,000 covered salaries and operations for 5.2 positions. In addition, $186,900 in add-on funds supported about 8.0 temporary positions and their operations through the University of Hawaii's Cooperative Park Studies Unit.

Kalaupapa National Historical Park: Although the service primarily focuses on preserving the historic structures and cultural history of the park, pig control fencing and trapping have been initiated in some upland areas, and planning is underway for fuller pest control programs.

Kaloko-Honokohau National Park: Culturally important structures at this relatively new park are impacted by red mangrove (Kaloko and Aimakapa fishponds) and other alien plants. The park has developed techniques for abating the mangrove problem and is being assisted by researchers from other parks in combating dryland alien plants such as kiawe.

Research Activities

NPS also supports most of the important current research on control methods for alien pests in native ecosystems.

HAVO: NPS provides the land, facility and operating costs for the U.S. Forest Service biological control research facility at HAVO (see below). The Research Division at HAVO pioneered work on pig habits and control techniques, rat and mongoose control (the latter with ADC), and chemical/mechanical forest weed

control. HAVO's Resource Management Division contributed to this research, working on goat and weed control techniques in cooperation with NPS research programs. In FY91, the Research Division had a budget of $143,000 with two permanent and four temporary positions.[75]

HALE: The Research Division focuses primarily on the ecology of native species and on documenting alien/native interactions. HALE research staff are also developing a program of community education and coordinated response to detect and remove new threatening pests throughout the East Maui region. In FY91, the division had a base budget of $125,000 with two full-time positions and $115,000 in special project funding.[76]

C. PRIVATE ORGANIZATIONS

A number of private groups (primarily nonprofit or volunteer organizations) are involved in Hawaii's pest control programs. The private programs described below dedicate a major portion of their resources to pest control. Many other groups (e.g., Hawaii Trail and Mountain Club, school ecology clubs, and civic organizations) supply motivated volunteer workers to assist in pest control work at National Parks, state reserves and other areas, or have alien pest control or research components within their other, primary programs.

1. Bernice Pauahi Bishop Museum[77]

Bishop Museum houses one of the world's most comprehensive collections of Pacific animal and plant specimens, and its scientific staff include experts in the identification and biology of plants, insects, snails, birds and many other groups of organisms. The museum is the primary source of expertise for identifying potential pests, responding to discoveries and referrals by government and private pest prevention and control groups. Museum staff also engage in important biological research and contribute significantly to pest control planning efforts. Computerization of museum collections information currently underway is intended, in part, to improve pest identification capability.

The Museum is a private, nonprofit organization funded by private donations, government grants and appropriations.

2. The Nature Conservancy of Hawaii[78]

The Nature Conservancy of Hawaii (TNCH) is a private, nonprofit group working to protect native species and ecosystems, primarily by protecting the lands they need to survive. TNCH manages ten nature preserves totaling over 20,000 acres. Roughly 90 percent of the staff and budget of TNCH's "stewardship" or preserve management program is directed at control of pigs, goats, Axis deer, weeds and other pest species.

TNCH relies almost entirely on NPS and other researchers for technical advice on control methods, and has no significant research program of its own. The methods used for pest control are very similar to those described for DOFAW, USFWS and NPS.

TNCH's Hawaii Heritage Program (HHP) is a staffed database of information on the status and location of rare native species and ecosystems. HHP staff also conduct field surveys to locate native species and ecosystems and to assess threats including alien pests.

The TNCH budget for preserve operations in FY92 is $1,224,000 which supports 14 staff positions. Staff are deployed on Oahu (5 positions), Molokai (3.5 positions), and Maui (5.5 positions).

3. Hawaiian Sugar Planters' Association[79]

Founded in 1882 as the Planters' Labor and Supply Company, the organization later evolved into the Hawaiian Sugar Planters' Association (HSPA). It is a voluntary, nonprofit association, whose mission is to maintain, advance, improve and protect the Hawaiian sugar industry, and to support its sugarcane research station. The organization is comprised of 12 companies that grow and/or process sugarcane, and is supported by membership fees per ton of sugar produced, a special legislative allocation from GACC, and grants and grants-in-aid from the federal government and private companies.

Recognized as one of the foremost sugarcane research centers in the world, HSPA's Experiment Station places special emphasis on developing new, high-yielding sugarcane varieties. It also conducts research to control diseases, insects and weeds that affect production, and studies residues and the environmental impacts of crop protection chemicals used on plantations. To protect against sugarcane diseases that have not yet reached Hawaii, HSPA sends commonly-grown Hawaii cane varieties to Taiwan and Fiji to test their resistance to diseases that exist in those two countries. HSPA scientists then use this information to prepare disease-resistant planting stock or disease control measures in the event these diseases reach Hawaii. Similar trials were conducted in Africa during the mid-1970s.

The Experiment Station is located in Aiea, Oahu with research substations on each of the four sugar-producing islands in Hawaii. The Station is organized into four research departments—Crop Science; Genetics and Pathology; Sugar Technology and Engineering; and Environmental Science.

The Crop Science Department researches weed, insect and rat problems. Generally, disease research focuses on new fungicides, while insect research is primarily on biological control using parasites and, to a lesser extent, chemical insecticides. Some of the department's recent research includes: rearing and releasing a lesser cornstalk

borer parasitoid; studying population dynamics of the yellow sugarcane aphid; and applying herbicides to control various grass weeds.

4. **Melastome Action Committee**[80]

The Melastome Action Committee (MAC) was organized in 1991 on Maui to prepare long-term prevention and control strategies for weed species in the Melastome family of plants. This family includes a number of shrubs or small trees that are either already established weeds in Hawaii or have demonstrated their potential as weeds by invading other tropical areas. A number of these plants are attractive as ornamentals, resulting in their importation for the horticultural trade. Staff from the USDA Soil Conservation Service, Resource Conservation and Development (RC&D), NPS, HDOA, DOFAW, TNCH, East Maui Irrigation and Maui Land & Pineapple Company are working together to plan and fund biological control programs, chemical and mechanical control methods, weed range maps, and public educational materials.

5. **Firetree Control Committee**[81]

Established in 1987, the goal of the Firetree Control Committee (FCC) is to develop and implement a long-term management plan to control the noxious weed *Myrica faya*, an invasive tree native to the Azores and Canary Islands. This plan is intended to guide both public and private actions for the next 20 years. Immediate objectives of FCC include:

a. Coordinating information exchange among agencies and individuals interested in the study and control of firetree;

b. Supporting biological control research development as a permanent solution;

c. Including firetree on the noxious weed list for all islands;

d. Informing the public, land managers and government officials of the potential impacts of this plant and developing direct control methods and public information on management techniques;

e. Encouraging individuals and land managers to control this weed on private property whenever possible;

f. Encouraging state and federal agencies to initiate eradication programs for isolated pockets of this weed, and containment programs of larger stands, when it occurs on public lands;

g. Supporting the development of new methods of direct control, including grazing methods and herbicide research; and

h. Maintaining and upgrading records of this weed's distribution in Hawaii.

The Committee is made up of 25 members, with representatives from the RC&D, Kau Soil and Water District, NPS, DLNR, USFS, UH-Hilo Campus, Cooperative Parks Studies Unit, HDOA, County of Hawaii, and area ranchers.

As its major activity, FCC supports biological control research to develop control agents for firetree through exploratory work by the University of the Azores in conjunction with the USFS biological control program at Hawaii Volcanoes National Park. FCC has also sponsored mass raising and release of proven insects on the Island of Hawaii. In addition, the Committee is continuing a research program on potential pathogens that may affect firetree.

FCC programs are on-going and funded by the state and federal governments. Its 1992-1993 budget of $190,000 represents funds from the state ($80,000), U.S. Forest Service ($55,000) and National Park Service ($50,000). Its limited staffing requirements are handled by RC&D staff.

6. **Hawaiian Humane Society**[82]

Since 1897, the Hawaiian Humane Society (HHS) has worked to prevent the cruel and inhumane treatment of animals, educate children and adults in the proper care and treatment of animals, and secure the enforcement of legislation for the prevention of cruelty to animals.

In addition to traditional animal welfare efforts, HHS provides animal control services on Oahu through a contract with the City and County of Honolulu. Some of the services provided by HHS include humane education, animal adoptions, animal shelter, humane euthanasia, and enforcement of all related laws, including nuisance, humane standards and cruelty.

During FY91, HHS handled over 22,000 animals. Eighteen percent of these were either adopted or found and returned to their owners. The majority of the animals (15,055) were cats, with 8,605 of them feral. The remaining animals included 7,111 dogs and 2,167 other animals (rabbits, guinea pigs, birds, fishes, turtles, mongoose, etc.). To help control the considerable feral cat population, HHS provides humane live-traps to the public at no charge. Trapped cats are then turned in to HHS for adoption or euthanization. In addition, HHS is in the planning stage of developing a more comprehensive program to address cat populations, including increased contact with individuals who feed colonies of feral cats and increased neutering of feral cats. The number of stray dogs declined dramatically in recent years, due in large part to enforcement of Hawaii's leash laws.

As a further response to pet overpopulation and the high number of unwanted pets that are euthanized each year, HHS strictly enforces its policy of neutering all

animals (six months and older) adopted from the Shelter, prior to release. For those animals under six months, an appointment for neutering is scheduled at the time of adoption, with staff or volunteer follow-up to ensure that the surgery is performed as scheduled. All neutering fees for adopted animals from the Shelter are included in the $35 adoption fee.

Under its Wild Bird Rehabilitation Program, HHS provides triage for injured birds in the Honolulu area. These birds (mostly non-native species) are evaluated by the veterinary staff and either rehabilitated at the Shelter, euthanized (if severely injured), or turned over to Sea Life Park, Paradise Park or the Honolulu Zoo, depending on the species. Occasionally, HHS receives other "exotic pets" and delivers them to HDOA for disposition.

The Society is made up of a 23-member, volunteer Board of Directors, a 41-member staff and over 150 volunteers. It has an annual operating budget of just over $2 million, with about one-half of this budget donated by the community. The other half is supported through two contracts with the City and County: (1) Animal Control Contract where HHS enforces dog licensing, animal nuisance complaints, inspects animal-related businesses and events, and investigates cruelty complaints and (2) Low Cost Spay/Neuter Program.

7. Maui Humane Society[83]

Established in 1962, the mission of the Maui Humane Society (MHS) is to prevent cruel and inhumane treatment of animals, provide shelter for old, sick, homeless, abandoned or injured animals, and encourage, promote and conduct research relating to the prevention of cruel and inhumane treatment of animals.

The Society accepts approximately 700 animals of all kinds each month feeding and caring for as many as 75 animals each day throughout the year. Recent shelter adoption rates have been as high as 50 percent for dogs and 20 percent for cats. Particularly concerned with pet overpopulation on Maui, MHS administers and helps finance the county's low-cost spay-neuter program for all cats and dogs adopted from the shelter (through deposits at the time of adoption). Other MHS projects include humane education, dog obedience training, and financial responsibility for felines and veterinarian services at the shelter. The Society conducts various fund-raising events throughout the year and has recently financed a crematory.

MHS is operated by a 17-member Board of Directors and a 15-member staff that includes an animal health technician and a veterinarian. It has a paid membership of about 300-350 per year and distributes its quarterly newsletter, *Cause for Paws*, to more than 2,500 members and donors.

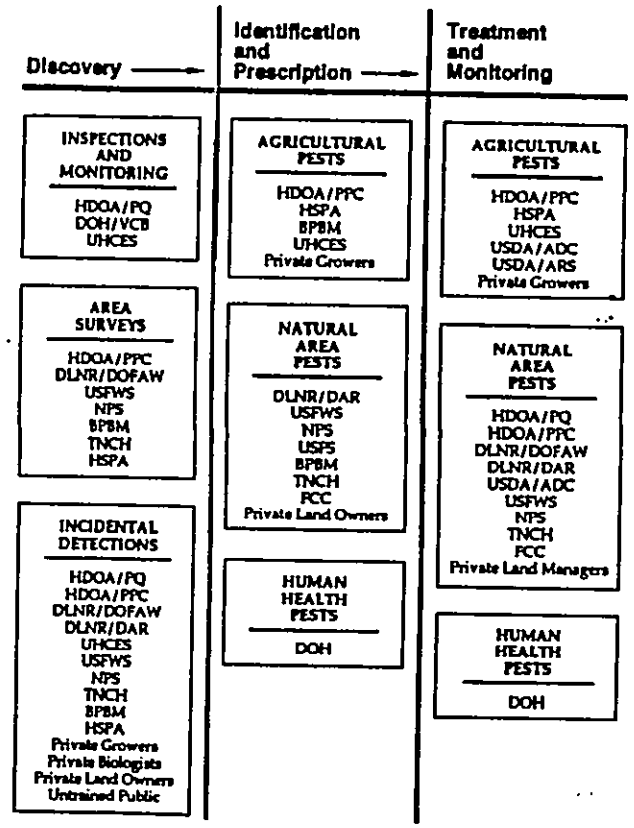
8. Sierra Club

Sierra Club Hawaii Chapter and its regional groups, through their Service Trip programs and High School Hikers Program, assist with weed control, fence construction and other work at NPS, USFWS, DOFAW and TNCH reserves. The Club organizes service trips, recruits volunteers from its membership and the public, and trains trip leaders. Through its newsletters and events, the Sierra Club has made alien pests a major, well-understood issue among its several thousand members.

D. INTERACTION OF AGENCIES AND ORGANIZATIONS

Hawaii's control system is carried out by a number of state, federal and private organizations. Although some overlap and coordination exists within this system, the various organizations generally operate independently. The following chart illustrates the state's existing control system. (See Appendix F for definitions of acronyms and initials.)

FIGURE 2 Hawaii's Control System



Chapter 5 Problems in the Current Prevention and Control Systems

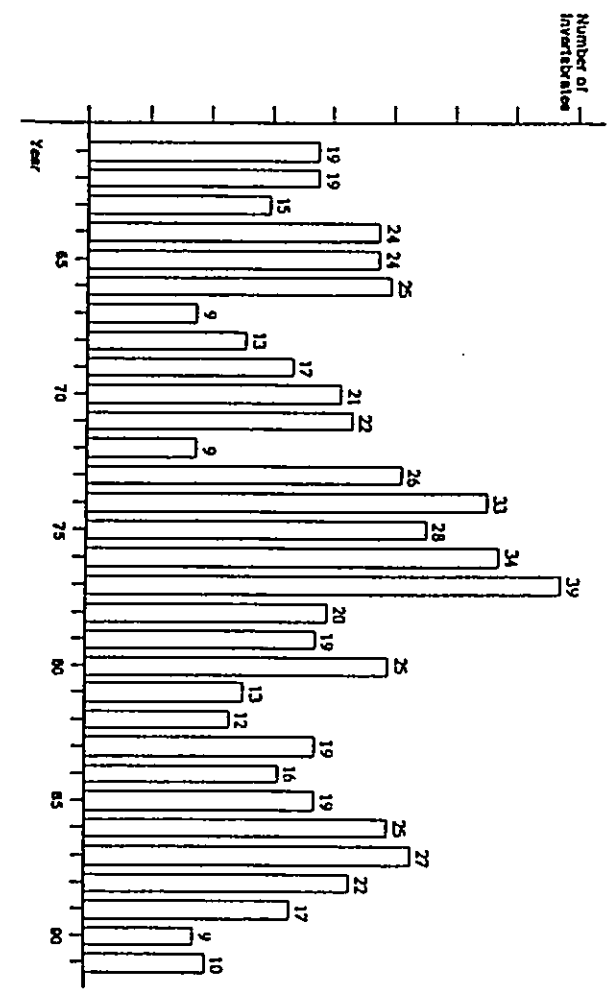
The findings described in this chapter are conclusions drawn by the TNCH and NRDC authors from the research conducted for this report. Although some of these conclusions reflect the ideas of interviewees or other authors, their presentation and interpretation here are the responsibility of the authors.

Despite the efforts of the many agencies described in the two previous chapters, unwanted alien species of plants and animals are entering Hawaii at an alarming—and increasing—rate. Between 1937 and 1961, an average of 16 new non-native invertebrate species were recorded in Hawaii each year; by the 1970s, the rate had increased to an average of 20 per year (Refer to Figure 3).[84] Approximately 50 percent of the immigrant invertebrates established between 1981 and 1991 are economic pests; five percent are "serious" economic pests.[85] Information on plants is inadequate to provide a solid estimate on weed introductions or an indication of how these rates may be changing. Available data suggest that alien plant species have been arriving in Hawaii during this century at the rate of about five per year.[86]

Since 1975, the red-vented bulbul, spiralling white fly, koa haole psyllid, melon thrips, lesser cornstalk-borer, leaf miner (*Liriomyza*), anthurium whitefly, banana bunchytop disease and maize chlorotic virus have all become established as new pests in Hawaii. Four new insect pests of sugarcane (the state's leading commercial crop) have become established since 1985;[87] of these, the lesser cornstalk borer alone has cost sugar planters an estimated $9 million since 1986.[88]

Managers of forest, watershed, endangered species habitat and farm lands face a growing set of pest problems as established alien species spread from their original infestations in one part of the State into previously undisturbed areas. In native forests, for example, the Australian tree fern (*Cyathea cooperii*), a valuable and long-established ornamental, has recently invaded Haleakala National Park, where it may displace native tree ferns.[89] Similarly, the Japanese bush warbler, an alien bird introduced to Oahu in 1929, made its way to native forests on Molokai in 1979 and has since spread to Kauai, Maui and Lanai.[90] While natural area managers on Maui have made great progress in controlling feral pig and goat populations, axis deer on the island have expanded their range and were sighted within Haleakala National Park in 1990.[91]

Figure 3 Number of Immigrant Invertebrates Reported in Hawaii: 1961-1991

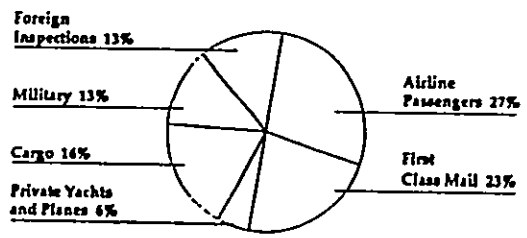


Source: Hara, Proceedings of the Hawaiian Entomological Society, 1992.

Sources and Pathways of Introduction

In a report to the 1989 Hawaii Legislature, HDOA provided results of an in-house survey in which plant quarantine inspectors ranked their perceived importance of various pathways in the introduction of insect pests and illegal animals. Replies were based on the inspectors' experience in conducting inspections and not from data on actual introductions. The top six pathways are illustrated in Figure 4.

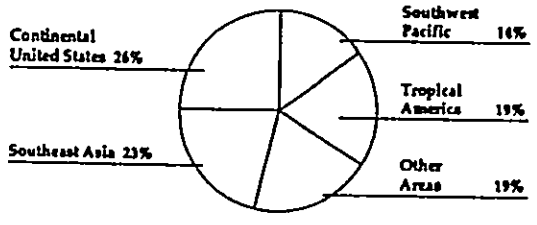
Figure 4
Major Pathways of Organisms Introduced to Hawaii



Source: HDOA, Report to the Fifteenth Legislature, 1989.

According to HDOA, between 1981 and 1990 an estimated 26 percent of new immigrant pest organisms originated in the continental U.S.[92] Estimates of other pest origins are presented in Figure 5. (For the purposes of developing the chart, an organism is credited to all areas where it is known to occur rather than only to its principal habitat.)[93]

Figure 5
Origins of Organisms Introduced to Hawaii 1981-1990



Source: Heu, Hawaiian Entomological Society, 1992.

AREAS OF CONCERN

The areas of concern described below are drawn from the interviews and other research carried out in the course of drafting Chapters 3 and 4 of this report, and from a workshop of 35 staff members from 17 prevention and control agencies held in October 1991.

A. Problems in the Prevention System

1. **A large proportion of the total passenger, cargo, and other traffic entering Hawaii is currently uninspected, including materials known to be significant sources of new alien species.**

Foreign Cargo[94]

Since the abandonment of the central Customs docks and warehouse after World War II, foreign cargo entering Hawaii is off-loaded and stored by a number of commercial shippers until Customs inspectors clear the goods for entry into the U.S. Customs must rely heavily on the cargo manifests filed by shippers whose reliability varies widely, although larger, established shippers tend to be more reliable than smaller, short-lived operations. Theft and smuggling of goods stored in commercial warehouses are significant potential sources of accidental or illegal introductions of alien pests.

Domestic Cargo

State HDOA-PQ inspectors are similarly dependent on self-reporting by shippers of goods from the U.S. mainland to Hawaii and domestic cargo is stored in commercial facilities where it is prone to the same theft and smuggling problems as foreign cargo. Only a small, random proportion of imported goods is inspected, except for certain imports (e.g., live fishes and birds) which are always inspected prior to entry, or which receive priority for as much inspection as possible within staffing constraints (e.g., propagated plants, cut flowers, foliage, and produce). Some classes of cargo (e.g., cut lumber) are currently not inspected although they are known to be likely sources of new pests.

Foreign Passengers

Following policy established in 1991, Customs now inspects only those foreign passengers who voluntarily submit materials to airport inspectors or who are identified through Customs profiling systems as "high risk". This policy is intended to detain as few foreign visitors as possible and allows the majority of foreign passengers to enter Hawaii without any inspection.

Domestic Passengers

Although there are no empirical data to support it, HDOA inspectors believe airline passengers and their baggage are the largest single source of unregulated alien species introductions.[95] As of July 1992, all passengers, officers and crew are required to submit a declaration form. Previously, only those passengers carrying plants, animals, soil or other materials were required to submit the form. Compliance

with this requirement has not been consistent. Passengers may not fill out the forms accurately and inspectors are not always present to check goods that have been reported.[96] Although the compliance of airlines in handing out, collecting and returning declaration forms to HDOA inspectors is increasing, it is still significantly less than total.[97] This system is supplemented by inspections of in-coming baggage by trained beagle dog teams. Still, only a small portion of domestic passengers is inspected.

As one possible solution, a resolution passed by the 1992 State Legislature asks HDOA, in cooperation with APHIS-PQ and Hawaii Department of Transportation, to study the feasibility of an "amnesty" program similar to that used by Australia and New Zealand. Passengers with unpermitted plants, animals or related products would be allowed to voluntarily turn in these items at an amnesty area in the airport.

Mail

Only a small fraction of all mail entering Hawaii is inspected. Domestic first-class mail presents the most difficult problem since this is protected against inspection without a warrant under current federal statutes. A pilot program conducted by USDA-APHIS in 1990 demonstrated that (1) contraband packages could be accurately detected by trained dogs; (2) search warrants could be obtained with little delay; and (3) a large number of packages leaving Hawaii for mainland addresses contain undesirable organisms.[98] A similar test for mail bound for Hawaii has not been conducted but is expected to confirm this pathway as a major source of potential pests. For other classes of mail which are inspectable, personnel and equipment availability limits the level of inspection. The U.S. Postal Service's mandate to protect mail delivery against any delay is another major concern that must be addressed in any enhanced inspection system.

Mail-order companies selling seeds, "beneficial insects" for organic gardening and other live material are another special area of concern.[99] While many such species may be harmless or even beneficial (e.g., ladybugs, some of which were introduced to Hawaii long ago), it is difficult to ensure that accidental introductions of other species do not occur. For example, beneficial insects are often propagated on the pest host they are intended to control; these pests hosts could accidentally be shipped with the beneficial insect and released with it. Because insects are not always easy to accurately identify and are vectors for diseases, such unregulated introductions are particularly high-risk. Although some companies comply with state laws regulating plant and animal imports, many others mail material to Hawaii without any notice to potential customers about special restrictions. Ordering these "products" through the mail without proper state and federal permits is a violation of existing regulations. The type and number of these operations appear to be increasing, as evidenced by 1991-1992 mail order packages of leopard frogs, Oklahoma harvester ants and "Earth Day" forest seed packages reported to state officials.

Private Planes and Boats

While all foreign vessels and aircraft must report their cargo to Customs for potential inspection, domestic private planes and boats present a special problem for inspectors. The arrival of private planes is unscheduled and their pilots and passengers are not required to report to any particular authority upon landing, making them very difficult for HDOA inspection staff to contact for declarations and inspection. Private boat traffic that docks at one of the public harbor facilities is easier to manage since the harbor master reports dockings to PQ. Boats landing at a private dock or anchoring off-shore are neither monitored nor inspected. PQ, however, believes that the risk of prohibited items coming in through this route is comparatively low.

Growing Inspection Demands and Additional Ports of Entry

Growth in inspection staffing and equipment has not kept pace with growth in in-coming traffic. For example, while the number of new HDOA quarantine inspection positions on Oahu increased by 15 percent from fiscal year 1971-1972 to fiscal year 1988-1989, the number of passengers increased by 138 percent, the number of air cargo and mail parcels increased by 236 percent, the number of nurseries requiring export certification inspections increased by 1,000 percent, and the number of restricted items requiring import permits and inspections increased by nearly 200 percent. Similarly, these limited staff positions have been more thinly spread as the number of inspection sites has grown. During the same period cited above, there was a 200 percent increase in the number of airport arrival gates, a 300 percent increase in the number of baggage claim areas, a 900 percent increase in the number of baggage carousels and a 400 percent increase in the number of cargo inspection areas.[100]

Planning for an international airport on Maui and the potential for other new ports of entry raises the need for developing pest prevention strategies as part of these plans. The disparity between inspection capacity and need will only widen unless plans and budgets for new air and sea ports incorporate design features and staffing to facilitate inspection.

2. **The effectiveness of inspections is hampered by inadequate sampling strategies.**

Targeting Inspections

Agency officials agree that in the face of inadequate resources to inspect all in-coming traffic it is essential to target inspections at the most likely sources of pest introductions. The effort currently expended to inspect a portion of the traffic entering Hawaii does not take full advantage of available technologies and strategies to target inspections. Customs' computerized profiling system at Honolulu Harbor has the capacity to target a much wider range of pest-carrying vectors. While PPQ also uses the system, identifying the types of cargo it wants held for inspection, it is not regularly used by other agencies. There is inadequate record keeping and no active database of inspection records to use in profiling the likely sources of pest introductions; inspectors rely primarily on their own experience and anecdotal

information from colleagues to determine which parcels, containers or passengers to inspect.

There is also little feedback from agencies involved in pest control to help in targeting potential new pests (see below). A considerable amount of valuable information appears to be lost in this way and improvement in targeting suspect materials is slower than it should be.

Tested Sampling Strategies

Although beagle dogs and their trainers are instructed and tested to detect snakes, fruits and other contraband items, there is little or no research or testing to establish adequate minimum inspection levels. For example, no testing has been conducted to determine what percentage of a test sample of contraband material in passenger baggage from the mainland would elude existing inspection programs. HDOA and other agencies have records of how many inspections they conduct each year and how many contraband items they intercept, but they have no way of knowing how much contraband material they are missing or how much additional effort would be minimally necessary to catch most of it.

Inspector Training

Detection of potential pest organisms is an especially technical matter in Hawaii because of the high volume and diverse origins of traffic through the State. No individual inspector, regardless of training, can know the thousands of kinds of insects, plants, fungi and other organisms that may pass through a given inspection station, nor their various life stages, modes of transport and potential as pests. New Zealand inspection officials regard specialization among inspectors as a key to successful detection programs—e.g., using teams of individual specialists rather than a few generalists to conduct inspections.[101] This Hawaii study did not conduct a close review of current training programs or specific technical duties of inspectors. This is an area that merits close attention for follow-up planning as a potential tool for increasing the effectiveness of the available inspection staff.

Preventive Treatment of In-coming Materials

Pesticide spraying of arriving aircraft should be considered a means to destroying insects or other hard-to-detect organisms that may not be detected in passenger or cargo searches. This is a basic element of prevention programs in New Zealand and Australia. Such a program in Hawaii during the 1970s demonstrated the potential for insect introductions via aircraft and should provide excellent background for implementing an improved inspection and spraying program.

Airport Design and Flight Schedules

A very large part of the sampling problem is due to two factors: (1) the various flights are timed to arrive in short "bursts" rather than being more evenly distributed, over a longer period of time and (2) the physical layout of the airport allows for quick exit by passengers with their baggage. Inspectors are unable to handle such a large number of people who arrive at roughly the same time and quickly exit with their

bags. While both arrangements are convenient for tourists, they make more thorough inspections impossible.

3. **Penalties for Illegal Introductions are Inadequate**

The current penalties for illegally importing animals, plants and plant pests to the U.S. vary from $100-$5,000 with or without additional imprisonment.[102] State law provides for penalties of $1,000-$10,000 for illegal importation of state-prohibited species. Recent efforts by HDOA and others to increase penalties succeeded in raising minimum fines from $100 to $1,000 for illegal imports. At the same time, however, the legislature removed imprisonment penalties. In 1992, an amendment increased fines and penalties and restored imprisonment penalties. (Refer to Appendix C for a brief history of changes to these penalties.)

Prevention agency staff believe judges and prosecutors are poorly informed about the seriousness of pest problems. This, combined with the already busy court schedule, appears to result in rare imposition of the heavier penalties. In addition, penalties appear to be inadequate to prevent individuals from allowing the escape or release of species that are desirable for agriculture or other uses (crops, pets, ornamentals, etc.) but which pose a known threat to other aspects of the state's economy or ecology.

4. **Federal quarantine programs do not adequately address Hawaii's special vulnerability to foreign pests.**

Transshipment via Hawaii to U.S. mainland

The shipment of organisms through Hawaii that are illegal here but legal on the mainland is a source of potential pests (e.g., the federal noxious weeds list includes only a few of the weeds of concern to Hawaii). Although such cargo must pass through all of the federal inspections, because the goods are not being received in Hawaii, the state has no authority to inspect them. Once importations have been cleared by federal authorities they are not re-inspected when they depart Hawaii nor upon arrival at their final destination. This provides an opportunity for these goods to be illegally distributed in Hawaii, possibly resulting in the introduction of new pest species.

Foreign Goods Shipped to Hawaii via U.S. Mainland

Foreign products often enter the U.S. through mainland ports and are later shipped as "domestic cargo" to Hawaii for sale. Federal inspections at mainland ports are often the only inspections these goods receive, hence, pests of concern only to Hawaii may pass undetected.

Inspector Training to Cover Hawaii Concerns

Military, Customs and USDA-APHIS inspectors meet annually to update training and review priorities for inspection. By including briefings from HDOA and state

and federal pest control agencies, federal inspectors could be much better prepared to assist in preventing unwanted introductions to the State.

5. **The current process for determining which species are to be prohibited from or allowed into the State does not adequately address the full range of alien pest threats, and does not give equal weight to the interests of alien pest control and those of horticultural and other plant and animal trades.**

Until the legislature's revisions of the quarantine law in 1990, the only regulatory vehicles for controlling movement of animals and plants into and between the islands were statutory provisions directing BOA to establish either lists of animals and plants allowed entry, or lists of prohibited animals and plants. BOA was also required to establish criteria and procedures for designating plants as noxious weeds and to designate plants as such for purposes of controlling infestation and controlling traffic in seeds of such plants. As noted in the discussions of HDOA-PQ and HDOA-PPC in Chapters 3 and 4, the 1990 revisions, with respect to importation lists for animals and micro-organisms, have been completed and the development of the plant lists await the completion of the noxious weed and noxious seed rules revisions.

All of these actions will bring more clarity to questions regarding importations into the State. In addition, because the lists are in rules and require public notice, hearings and comment for revision, more public involvement may be possible.

Yet despite these improvements, there are still areas of concern. The two major issues both result from an institutional bias toward protection of agriculture and human health in evaluating the potential of species to cause harm. While this bias is changing, there remains some question as to whether the revised noxious weed and noxious weed seed rules will (or the animal and micro-organism lists do) include all species that have, or can be predicted to have, large impacts on nonagricultural lands or organisms but may have little impact on crop or pasture lands or species. Another concern arises from the statutory language that establishes "sowing purposes" as the only regulated use of seeds, as opposed to evaluating and regulating all seeds for their potential as pests regardless of use.

Related to this concern is a question as to whether the stated policy of HDOA to encourage development of new agricultural industries,[103] which is likely to include importing new crop varieties for experimentation, (1) has a component for screening such new varieties for their potential to become unwanted aliens, and (2) is in conflict with programs that discourage the introduction of pest species.

B. Problems in the Control System

1. **Response to new infestations is frequently delayed by jurisdictional or organizational problems, allowing pests to become established and, in some cases, to spread beyond control.**

No Clear Reporting Mechanism for the Public

Until the February 1992 establishment of the HDOA "Pest Hotline", there has been no clear reporting mechanism for the public or agency staff who detect pest infestations. Lacking this, people have either failed to report the infestation or may have called any of over a dozen federal, state or private organizations, a number of which have no clear authority or cooperative arrangement under which to act. Most pest reports, therefore, fail to result in any prompt control action. Notable exceptions are those few pests addressed in pest-specific contingency or control plans, usually developed cooperatively by several agencies (e.g., banana bunchy-top disease, bulbuls and brown tree snake control programs). To be effective, the new Pest Hotline must become as well known as the "dial 911" program for police or other emergencies and must be backed up by thorough contingency planning (see below).

Unclear or Conflicting Agency Jurisdiction

Because most agency control programs have evolved to address a particular segment of the pest problem (e.g., HDOA to control agricultural pests, DOH to control vectors of human disease, DOFAW to control forest pests), gaps between the numerous agency jurisdictions abound. Perhaps the most apparent gap occurs in land classified as conservation where HDOA is responsible for certain "escaped" pests and DLNR is responsible for "established" pests. It is often difficult to determine the extent of infestation without undertaking considerable field investigation. If the species is not clearly identified on a state prohibited species list (e.g., if it is a plant of horticultural value such as *Miconia calvescens* or an escaped house pet such as rabbits), questions over authority to take action may further delay any response. Privacy issues also raise questions of jurisdiction and may prevent prompt control efforts, both because the pest in question may be on private property and because access to private lands may be needed to carry out control.

Little Contingency or Cooperative Planning

Contingency plans help agencies prepare for a predicted pest introduction. They are used to alert all agencies that will need to cooperate to control the infestation, establish agreements in advance as to respective duties and commitments, and prepare to use the best available control methods with minimum delay by procuring and distributing necessary equipment and training. In Hawaii, contingency plans have been developed for brown tree snake control (involving eight state and federal agencies) rabies, several serious human diseases and a few sugarcane pests (primarily through HSPA predictive research).

Cooperative plans bring agencies and landowners together to control an established pest in a given geographical area (e.g., existing plans for banana bunchy-top disease,

bulbuls). Although several new plans are currently being discussed, few are actually in place.

Limited Access to Infestation Sites

Access to an entire infestation area has been a significant factor in delaying control responses. Efforts to eradicate Maui's only infestation of banana poka (an important forest weed) were slowed by private landowners who are hesitant to allow state crews onto their property. Papaya ringspot virus was successfully eradicated on Maui, Kauai and the Kau region of the Big Island, but has continued to spread through the Puna district through backyard plantings in new subdivisions. Although existing regulations authorize HDOA to enter private property to control or eradicate any organism designated as a pest, in both agricultural and conservation settings, managers are sometimes limited to controlling only those parts of an infestation that occur on the property of willing cooperators. Under existing regulations HDOA may enter any private property to control or eradicate any organism designated, under appropriate criteria and procedures, as a pest only after giving five days written notice to the landowner and occupier. On land classified as conservation, federal, state and private organizations are just beginning to work together to organize pest control operations across ownership boundaries. Their work to date has been largely restricted to those portions of pest populations within their own lands.

Little Surveillance Monitoring to Track Infestations and Support Prompt Decision Making

The ranges of most of the serious, established pest species in Hawaii have not been mapped and no system exists to systematically locate and map these or new pests. Many control agencies have mapped significant weeds, diseases, predators or hoofed animals within their individual project areas, and a few on-going projects are monitoring the spread of an infestation or the effectiveness of a control effort. These are not shared, compatible systems, however, and are not adequate to support statewide, multiagency planning for more effective control. Without a clear picture of the size and distribution of a pest population, agency staff sometimes lack confidence that control actions will be successful and therefore find it difficult to take decisive action against newly reported infestations.

2. **Interisland spread is a major, largely unregulated problem.**

A number of serious pest species are established in Hawaii but have not yet invaded all islands or island districts. In spite of preclearance inspections for produce and other selected items in interisland traffic by HDOA, and targeted efforts by HDOA and DLNR to prevent the spread of several serious pests (e.g., papaya ring-spot virus, banana poka), uninfested portions of the State remain highly vulnerable to the spread of established pests. Vectors for the spread of pests include both commercial and noncommercial transport of plants, soil and other materials between islands, movement of soil-laden heavy equipment carrying weed seeds, hikers and hunters carrying seeds in their boots and gear, interisland mail, stowaway animals on

aircraft and boats, and birds blown across the shorter interisland channels. Although several small-scale or informal efforts are underway, no island currently has a multiagency plan to protect it against this interisland spread of costly pests.

3. **Control efforts are not taking fullest advantage of available technologies.**

Coordinated Expansion of Biological Control Programs

Although Hawaiian biological control programs have been pioneering and productive, they have two major needs. One, is that while modern programs generally include rigorous pretesting of proposed organisms to minimize the risk to many nontarget species of commercial interest, they less often, although just as necessary, include testing for other potential negative environmental impacts. Such impacts may include enhancing the targeted pest, interacting with other organisms to create new pest problems or attacking nonpestiferous or beneficial organisms. The second need is to support long-term monitoring of all releases to determine their efficacy as well as their direct and indirect effects on the environment.[104] The existing facilities and programs are not adequate to meet these needs.

HDOA insectaries and plant pathogen labs are not large enough to accommodate the full needs of agriculture or to undertake more than a small fraction of the forest pest work. Moreover, the lab site in downtown Honolulu is about to be displaced by a state housing project and a new site has yet to be found. Meanwhile, the multiagency research program has developed biological control protocols for forest weeds at the Hawaii Volcano insectary. This program, however, needs to be expanded to enable more evaluation of potential biological agents and needs to develop an insect-rearing facility for release of tested biological control agents for use in large-scale pest management. Agriculture and natural area biological control researchers have collaborated, but they have not yet developed a cooperative, long-range strategy to develop facilities and make the best possible use of available resources.

Research on Pest Biology and Control Methods

Control programs can be greatly enhanced through biological research to identify pests' vulnerabilities (e.g., the best time of year or life-phase to control a population) and research to refine control methods. The University of Hawaii Cooperative Extension Service, HDOA, HSPA, UH-Horticulture Department (through its Integrated Pest Management Project) and others in the agricultural sector sponsor such work on selected farm pests. This is not enough, however, to keep up with the flow of new pest species. Meanwhile, there is also a great need for additional research on forest pests. Several of the important mammal pests have received attention but only a handful of weed and invertebrate pests have been studied at any level. For several years, NPS funded the only full-time weed biologist in Hawaii focusing on natural areas. This position was lost when project funding ran out.

Alien species problems have not been a major focus for biology programs at the University of Hawaii.

4. **Agency mandates sometimes call for maintenance of potentially destructive alien species as resources for sport hunting, crops, aesthetic resources or other values.**

Established Game Animal Populations

DLNR-DOFAW has the dual mandate of protecting native ecosystems and promoting sustainable game hunting on state lands. The conflict inherent in these two missions has been approaching resolution in recent years as the Division has adopted a policy of no additional game mammal introductions and of removing game mammals from areas for native ecosystem protection (e.g., plant sanctuaries and Natural Area Reserves), while maintaining hunting in less sensitive habitats or as a tool for game removal in protected areas. Still, a great deal more work remains to be done to protect native habitats from these mammals. Although game birds are regarded as vectors of avian disease to native birds and as a possible threat to other aspects of the native ecology, no programs are underway to clarify and address this potential problem.

Protected "Wild Birds"

All birds living in a nondomesticated state are protected in Hawaii as "wild birds." This law protects all such birds (native and alien) until a permit is obtained for control activities, providing a buffer against uncontrolled destruction of potentially valuable alien birds. The protection provided under this law, however, also delays control of potentially pestiferous birds and creates jurisdictional confusion. For example, escaped poultry are the responsibility of both HDOA-Animal Industry Division and DLNR-Division of Forestry and Wildlife; and although a flock of escaped domestic geese might be a threat (via disease or competition) to native species, they are protected as "wild birds".

Established Crops, Horticultural and Pet Species

A number of alien species established in Hawaii have proven value for agriculture or other purposes but are also known to be serious threats to other natural resources. Passion fruit, guava, apple snails, domestic cats, pet parrots, domestic rabbits and many other alien species are known to damage desirable crops, native species or other resources but will most likely continue to be maintained in Hawaii because of their economic, aesthetic or other values. As a result, control programs for these species have been limited to their on-going removal from sensitive areas. In 1992, in an effort to discourage "dumping" of unwanted animals, a law was passed making it a misdemeanor to abandon one's own animal or an animal known to belong to another person. (Also, see above regarding the need for strengthened penalties for release of destructive species.)

Chapter 6 Next Steps Toward More Effective Prevention and Control

A. Major Needs

Despite the fact that some aspects of Hawaii's pest prevention and control systems are among the best and most innovative in the world, these systems are clearly inadequate in the face of the on-going flow of new pests into the State. We believe that two major developments are needed to address the issues raised in the previous chapter:

1. **A Cohesive and Comprehensive Multiagency System**

   The many different agencies and groups working on pest prevention and control must be organized into a cohesive, comprehensive system weighted heavily toward preventive measures. Over the past 100 years, agency programs have arisen ad hoc to address the specific concerns of a particular audience (e.g., protecting mainland agriculture from plant pests, preventing rabies from entering the State or controlling the pest species on a particular nature reserve). The result is a set of programs that are generally effective within their own jurisdictions but which, together, leave many gaps and leaks for pest entry and establishment. In particular, a cohesive, multiagency program must invest more heavily in prevention because the costs of prevention and chances for success are so much more favorable than for control after a pest becomes well established. Following the example of New Zealand (Appendix D), prevention systems must begin in earnest at the port of origin for people and materials bound for Hawaii. This pre-entry prevention must have multiple back-up systems in the form of adequate port-of-entry inspection and effective mechanisms for rapid control responses when a new infestation is first discovered.

2. **Public Support and Involvement**

   Public support for and involvement in strengthened prevention and control efforts must be greatly enhanced through education. Although public understanding of such apparent threats as snakes and other dangerous animals has increased through media exposure during the past year, the average citizen remains unaware of the magnitude of the alien species problem. Effective systems will require strong public support and participation, essentially making alien pest prevention and control a part of everyday life for people living in Hawaii. Also, visitors to Hawaii and businesses seeking opportunities here must be informed of Hawaii's special vulnerability and of the clear steps they must take to minimize the risk of new pest introductions. Congress and other public officials must also be informed of Hawaii's concerns.

B. An Approach to Planning

For both technical and political reasons, the planning effort needed to develop a cohesive, comprehensive pest prevention and control system will be a major undertaking. To produce meaningful results it must include all of the agencies and groups described in this study and satisfy the concerns of their wide range of constituencies. Perhaps most importantly, it must be guided by a simple, clear policy that identifies the standard of excellence Hawaii aspires to in this field (e.g., "Hawaii will develop a pest prevention and control system that is equal to any other in the world", or "...that is the most effective in the world", or " ...that reduces the influx of new pest species into the State to ten percent of present levels by the year 2000", etc.)

Because of its long history and broad involvement in pest programs, the Hawaii Department of Agriculture is the most appropriate agency to coordinate this planning effort. We offer the following ideas on how to develop this plan:

Maintain the current HDOA Pest Hotline, amnesty programs, Audubon Society ASAP program and other public awareness efforts while aggressively pursuing multiagency planning.

These programs are building public interest and improving the climate for stronger prevention and control programs. They will need to offer the public a compelling and more complete strategy to take part in within the next year or so, and this depends on an ambitious planning effort.

Immediately organize a multiagency planning effort, to be pursued in two phases.

These phases may overlap considerably and some elements (particularly control efforts in Phase 2) should not be postponed if parties are ready to pursue them. The elements in Phase 1, however, need to be resolved before Phase 2 elements can be adequately addressed.

Phase 1

Representatives of all prevention and control agencies and relevant private organizations should meet by August 1992 to initiate cooperative planning. This process should be guided by mutual goals and principles established in advance, with the clear agreement that the group will produce action plans that all participating parties will help to implement. The services of trained meeting facilitators may be

warranted to keep meetings on track and moving ahead. Specialized task forces or committees should then address the following priorities:

a. Pre-entry prevention strategy
What more can be done to inform people planning to visit Hawaii or to ship or mail goods here of Hawaii's pest concerns before they or their goods leave their homes bound for the islands, or at least before they actually reach Hawaii? This should include a review of information provided with visa applications, importation permits, and domestic traveler and commercial information (Hawaii Visitors Bureau and travel agency materials, mail order catalog information, postal service information on mailing to Hawaii, domestic shipper information, in-flight/en route information). What more can be done to strengthen trade agreements or enforcement to stop potential pests at the port of origin? This should include a review of trade agreements and current internationally-based inspection.

b. Port-of-entry sampling and inspection strategy
Develop a method of sampling/inspection that can achieve the prevention standard established to guide this planning effort (above). For example, if the standard is to be as good as any prevention system in the world, consult the best existing systems (probably New Zealand and Australia) and adapt sampling schemes to Hawaii's needs. This task force should determine how much of the first-class mail needs to be inspected and the method that should be used, but should leave the legal/regulatory issues to the task force described next, below. Identify sampling/inspection improvements that can be made within existing staff, equipment and airport/harbor facilities, and any additions or changes required if existing resources cannot fulfill the standard.

c. Statute, policy and rules review to clarify conflicts/gaps and determine coordinated approach for resolving them
What statutory, policy or rules changes are needed to promote the most effective prevention and control system? This task force should address the adequacy of the current noxious weed and weed seed rules, animal import rules, etc. in promoting the system standard. It should also produce a draft policy clarifying how pest concerns and the promotion of needed imports, tourism and other traffic are to be balanced by agency decision makers. The work of this task force should provide clear steps for producing and maintaining a list or other mechanism to clearly establish which species are allowed in the State and which are prohibited. It should also identify state or federal programs that may be promoting agricultural diversification or other import-oriented programs that may contradict prevention and control goals, and propose resolutions to any such contradictions.

d. Rapid response strategy
Pest control agencies should devise short- and long-term plans for responding rapidly to new infestations. This should address development of a central "hotline" or other reporting mechanism, pooled staffing and equipment to form island

response teams as used in the Brown Tree Snake plans, establishment of contingency funding and planning to promote rapid and effective responses, and an initial list of priority pests meriting such concerted rapid response.

e. Statewide control strategies for selected, established pests
A multiagency/landowner group should establish a statewide strategy to address the interisland spread of selected major pests (e.g., preventing firetree from reaching Molokai, or keeping bulbuls off Kauai) and should especially focus on establishing priorities for eradication of localized pest populations where there is a good chance of removing them from entire islands or the whole State. This group or, more likely, a special subcommittee, should develop a coordinated federal-state-private plan for expanding biological control to a more fully operational scale (especially for forest pests), including planning for facilities development.

Phase 2
The results of Phase 1 planning are expected to produce significant new information and to clarify needs that merit further agency coordination of programs. In Phase 2, task forces or committees should address the following:

a. Cohesive training strategy
With inspection and rapid response needs identified in Phase 1, agencies can plan shared or joint training to maximize the impact of available personnel and information.

b. Coordinated data systems
Inspections and control programs planning are expected to identify specific data support needs for use in improving the targeting of future inspections, tracking established pest populations and developing control methods. Systems to service these needs can then be devised and should be based, where possible, on the existing databases at the Bishop Museum, CPSU, U.S. Customs, The Nature Conservancy's Hawaii Heritage Program, the Office of State Planning multiparty GIS and others. A system to document the cumulative costs of pest impacts and prevention/control systems should also be devised as a tool for future planning and for use in public education.

c. Coordinated research strategy
Phase 1 discussions should begin to identify needs for additional research to refine prevention and control methods. This research can be completed most efficiently by coordinating priorities and pooling available funds.

d. Expanded public awareness campaign
Agreements in Phase 1 should have produced a compelling and practical strategy that can be shared with the public, together with additional specific messages to prevent and control pest problems. This campaign should be geared to involve the public in the program and to set the stage for any legislative or other measures that require public support. The centerpiece of this campaign should be a clear goal for

the program, such as: "X" *new pest species are established in Hawaii each year. Our goal is to cut this to "y" species per year by the year 2000.*

C. Further Recommendations

We believe strongly that the following considerations should be included in any new planning effort in this field.

First, Hawaii is not alone in its need for improved pest prevention and control systems. We can benefit (and save considerable expense and time) by taking advantage of existing systems in New Zealand, Australia and other countries. (In spite of its greater size and equal biological sensitivity to alien species, New Zealand receives an average of less than five new alien species per year.) The planning process above should invest heavily in involving experts from New Zealand, Australia, Fiji and perhaps Florida, where excellent potential solutions are available and where other people are wrestling with the same problems in similar environments. Hawaii also has a great deal to offer these and other nations and states, having one of the longest-established and most effective programs in this field. Alien species problems are now arousing concern in continental areas as well, and Hawaii's solutions will be of wide interest. A Pacific basin workshop and staff exchanges would be valuable tools for information sharing.

Second, planners should take advantage of other information not covered in this report. In particular, strategies developed for the prevention and control of human disease may have broad applicability. Research by existing task forces and a forthcoming nationwide alien species study by the Congressional Office of Technology Assessment will also contain valuable information.

Third, do not sacrifice specialization for centralization. Pest prevention and control is a highly technical business, requiring expert people focused on key threats and special problem areas. We believe it would be a serious mistake to merge all agricultural, customs and wildlife inspectors, for instance, under one agency and have each of them be a "jack-of-all-trades" at the airport. We need to protect Hawaii from many thousands of potential pest species and no one person can know a large proportion of that threat well enough to prevent its entry.

Fourth and finally, we are convinced that Hawaii should and can be the best in the world in this important business. One of the most striking and gratifying findings of this study has been the high level of professionalism and dedication among the staff trying to fulfill their pest prevention or control mandates within limited, sometimes inadequate, resources. Interviews and workshops revealed a broad agreement that improvements must be made, with clear evidence that many groups and individuals are already pursuing such improvements to their fullest ability. The October 1991 multiagency workshop was particularly convincing evidence of the potential for improvement through better coordination of existing personnel,

equipment, funds and knowledge. Many individual facets of Hawaii's current prevention and control systems are acknowledged leaders in their field. Moreover, Hawaii's positive international image compels us to be the best, and our irreplaceable natural resources deserve nothing less than our all-out effort to protect them.

Endnotes and References

Endnotes

Notes to pages 1-5.

Chapter 2

1 Hawaii Agricultural Alliance, Introduced Species, 1991.

2 GACC, Annual Reports, 1988-91.

3 Ohta, Asher, HSPA. Written communication to Wayne Mecalf, April 5, 1990.

4 DOH, Nonpoint Source Assessment, 1989; review comments of The Alien Pest Species Study, Draft Three, by Mike Buck, 1992.

5 This section is based on HDOA, Annual Report, 1991; DLNR, Exotic Game Birds, 1967; and review comments of The Alien Pest Species Study, Draft One, by Ron Walker, 1991.

6 This section is based on DLNR et. al., Hawai'i's Extinction Crisis, 1991, with updated numbers, as of June 1992, from USFWS.

7 Tamashiro et. al., Formosan Termite, 1987.

8 Smith, Burt, UH-Cooperative Extension Service. Telephone conversation with Susan Machida, April 28, 1992.

9 Smith, Burt, UH-Cooperative Extension Service. Telephone conversation with Susan Miller, August 20, 1991.

10 Costales, Patrick, DLNR-DOFAW. Telephone conversation with Susan Miller, May 10, 1991; August 19, 1991. Per Mr. Costales, figures are from DLNR-DOFAW fire reports.

11 Corn, Carolyn, DLNR-DOFAW. Telephone conversation with Susan Miller, August 19, 1991.

12 This section is based on a facsimile transmission by Robert Worth, DOH-CDD, to Susan Machida, February 10, 1992.

13 DOH, Annual Report, 1989.

14 See Fritts, The Brown Tree Snake, 1988; and Engbring and Fritts, Demise of an Insular Avifauna, 1988.

Chapter 3

15 This section is based on a telephone conversation between Larry Nakahara, HDOA-PQ, and Jodi Bailey, February 25, 1991; telephone conversation between Josiah Wong, U.S. Customs, and Susan Miller, May 3, 1991; an interview with Creighton Goldsmith and Jean Thomas, U.S. Customs, by Miller, October 9, 1991; a facsimile transmission from Thomas to Miller, February 8, 1992; and review comments of The Alien Pest Species Study, Draft Three, by Goldsmith, 1992.

16 Yoshinaka, Bruce, U.S. Customs. Telephone conversation with Susan Miller, February 2, 1992.

17 This section is based on an interview with Carroll Cox, USFWS-LE, by Susan Miller and Jodi Bailey, January 16, 1991; telephone conversation between Faith Campbell, NRDC-WDC, and Miller, August, 2, 1991; telephone conversation between Andy Yuen, USFWS-LE, and Miller, August 18, 1991; telephone conversation between Frank Dohaylonsod, USFWS-LE, and Miller, February 18, 1992; review comments of The Alien Pest Species Study, Draft Three, by Dohaylonsod, 1992; and the statutes and regulations cited in Appendix B.

18 The multi-lateral CITES agreement regulates the international movement of the animals and plants listed in its appendices. The ESA regulates trade or movement within the US and its territories of any species listed by USFWS as endangered or threatened. In addition, the Lacey Act regulates traffic of virtually all animal species and some species of plants. It empowers USFWS to regulate movement of injurious species, as well as species protected by state or foreign law. This agency also has the authority to investigate violations of state wildlife or alien species laws.

19 Dohaylonsod, Frank, USFWS-LE. Telephone conversation with Susan Miller, February 18, 1992.

20 This section is based on an interview with Glenn Hinsdale, USDA-PPQ, by Susan Miller and Jodi Bailey, May 8, 1991; and facsimile transmissions by Hinsdale to Susan Machida, February 12, 1992 and February 28, 1992; review comments of The Alien Pest Species Study, Draft One, by Wayne Kobayashi, HDOA-PPC, 1991; review comments of The Alien Pest Species Study, Draft Three, by Hinsdale, 1992; and relevant statutes and regulations cited in Appendix B.

21 As noted in Chapter 150, HRS cited in Appendix B of this report, "agricultural seed" includes the seed of grass, forage, cereal, and fiber crops and other kinds of seed commonly recognized within the state as agricultural seed and mixtures of these seed, and may include noxious weed seed. "Vegetable seed" includes the

seed of those crops that are grown in gardens and on truck farms and are generally known and sold under the name of vegetable seed in the state.

[22] Kobayashi, Wayne, HDOA-PPC. Review comments of The Alien Pest Species Study, Draft One, 1991. Per Mr. Kobayashi, 11 weeds are as follows: *Lepidium draba, L. repens, Hymenopyxis pubescens, Cirsium arvense, Cuscuta spp., Agropyron (= Elytrigia) repens, Sorghum halepense, Convolvulus arvensis, Centaurea pecris, Sonchus arvensis and Euphorbia esula.*

[23] This section is based on an interview with Lt. Col. Paul Behm and Lt. Col. Tom Brown, USPACOM-MCI, by Susan Miller, August 9, 1991; a telephone conversation between Behm and Miller, February 12, 1992; correspondence from Brown to Miller, April 23, 1992; and review comments of The Alien Pest Species Study, Draft Three, by Brown, 1992.

[24] This section is based on USDA, Inspecting Mail to Mainland, 1990; Piianaia, Statement before the Senate Committee on Governmental Affairs, June 5, 1991; Hughes, Statement before the Senate Committee on Governmental Affairs, June 5, 1991; and a letter from Charles Braun, USPS, to Buford Knowles, USPS, October 30, 1979.

[25] USDA, Inspection of First Class Mail in Hawaii, 1991.

[26] Braun, Charles, USPS-General Counsel. Correspondence to Buford Knowles, USPS-Customer Service Department, October 30, 1979.

[27] Nakahara, Larry, HDOA-PQ. Interview with Susan Miller and Jodi Bailey, January 15, 1991.

[28] Piianaia, Senate Committee on Governmental Affairs, June 5, 1991.

[29] This section is based on a telephone conversation with Dale Cooper, USFDA, by Susan Machida, February 14, 1992.

[30] This section is based on a telephone conversation with Larry Nakahara, HDOA-PQ, by Alan Holt, April 3, 1992; and a telephone conversation with Gary Toyama, DOH-VCB, by Holt, April 3, 1992.

[31] Existing noxious weed and noxious weed seed rules are being revised and updated. Public hearings on these revisions were held in March and April 1992.

[32] This section is based on an interview with Larry Nakahara, HDOA-PQ, by Susan Miller and Jodi Bailey, January 15, 1991; telephone conversation between Nakahara and Bailey, February 25, 1991; telephone conversation between Nakahara and Miller, February 18, 1992; and review comments of The Alien Pest Species Study, Draft One, by Nakahara and HDOA, Annual Report, 1989.

[33] Nakahara, Larry, HDOA-PQ. Telephone conversation with Jodi Bailey, January 15, 1991. Per Nakahara, HDOA-PQ is responsible for non-domestic animals; HDOA-IQB is responsible for domestic animals.

[34] Nakahara, Larry, HDOA-PQ. Telephone conversation, February 25, 1991.

[35] At press time, a bill waiting for the Governor's signature would continue the present requirement for transportation companies to provide the forms to all persons on board but also require that all (one adult per family) fill out declarations, regardless of whether they carried any potentially harmful items on their person or in their baggage. The bill also requires any transportation company officers and crew to immediately report to PQ any sightings of animals or plants on board.

[36] These figures derived from a telephone conversation between Larry Nakahara, HDOA-PQ, and Susan Miller, February 18, 1992; and HDOA, Annual Report, 1991.

[37] This section is based on an interview with Gary Moniz, HDOA-IQB, by Susan Miller, May 21, 1991; review comments of The Alien Pest Species Study, Draft Three, by Moniz, 1992; and relevant statutes and regulations cited in Appendix B.

[38] Nakahara, Larry, HDOA-PQ. Telephone conversation with Susan Miller, February 18, 1992.

[39] B&F, Supplemental Budget Request, 1992; and HDOA, Annual Report, 1991.

[40] This section is based on a telephone conversation between Jason Moniz, HDOA-LDC and Susan Machida, February 10, 1992; review comments of The Alien Pest Species Study, Draft Three, by Moniz, 1992; and HDOA, Annual Report, 1990.

[41] As noted in the administrative rules cited in Appendix B of this report, "accredited veterinarian" means a veterinarian certified by federal and state animal health authorities to participate in cooperative disease control activities, including execution of health certificates for the interstate and international movement of animals.

[42] Moniz, Jason, HDOA-LDC. Telephone conversation with Susan Machida, February 10, 1992.

[43] Moniz, Jason, HDOA-LDC. Telephone conversation with Susan Machida, February 10, 1992.

[44] This section is based on a letter by The Brown Tree Snake Group to Senator Daniel Inouye, August 31, 1991; and a statement by Ben Blaz before the House Committee on Merchant Marine and Fisheries, July 31, 1990.

[45] This section is based on meeting notes of the Noxious Plants Task Force, December 4, 1991 and February 20, 1992.

[46] This section is based on correspondence from Jason Moniz, HDOA-LDC, to Susan Machida, April 23, 1992.

[47] This section is based on correspondence from Sheila Laffey, National Audubon Society, Hawaii State Office, to Alan Holt, (n.d.).

[48] This section is based on correspondence from Lorin Gill, MGF, to Susan Machida, February 10, 1992; correspondence from Sheila Laffey, National Audubon Society, Hawaii State Office, to Alan Holt, (n.d.); and review comments of The Alien Pest Species Study, Draft Three, by Gill, 1992;

Chapter 4

[49] This section is based on an interview with Larry Nakahara, HDOA-PQ, by Susan Miller and Jodi Bailey, January 15, 1991; telephone conversation between Nakahara and Bailey, February 25, 1991; telephone conversation between Nakahara and Miller, February 18, 1992; review comments of The Alien Pest Species Study, Drafts One and Two, by Nakahara; and HDOA, Annual Report, 1989.

[50] Currently, PQ is responsible for the brown tree snake.

[51] This section is based on telephone conversation with Ken Awtrey, Big Island RC&D, and Susan Miller, April 23, 1991; memorandum from Lyle Wong, HDOA-PID, to Jodi Bailey, November 7, 1991; telephone conversations between Myron Isherwood, HDOA-PPC, and Miller, February 2, 1991 and June 7, 1991; facsimile transmission from Isherwood to Susan Machida, February 12, 1992; facsimile transmission from Ron Heu, HDOA-PPC, to Machida, February 13, 1992; facsimile transmission from Pat Conant, HDOA-PPC, to Machida, March 19, 1992; and review comments of The Alien Pest Species Study, Drafts One, Two and Three, by HDOA-PPC staff and Cliff Smith, UH-CPSU.

[52] Isherwood, Myron, HDOA-PPC. Telephone conversation with Susan Machida, March 30, 1992.

[53] Funasaki et. al., Review of Biological Control Introductions, 1988.

[54] Howarth, Annual Review, 1991. Noted in review comments of The Alien Pest Species Study, Draft Three, by Pat Conant, HDOA-PPC, 1992.

[55] Howarth, Classical Biological Control, 1991.

[56] Participating organizations are: HDOA, DLNR (lead), NPS, USFS, USDA and UH.

[57] Smith, Cliff, Cooperative National Parks Resources Studies Unit. Telephone conversation with Susan Machida, April 16, 1992.

[58] HDOA, Annual Report, 1991.

[59] This section is based on an interview of Ron Walker, DLNR-DOFAW, by Jodi Bailey, January 25, 1991; personal communication between Walker and Susan Miller, February 13, 1992; telephone conversation between Walker and Miller, February 14, 1992; and review comments of The Alien Pest Species Study, Drafts One, Two and Three, by DLNR-DOFAW staff.

[60] Buck, Michael, DLNR-DOFAW. Personal communication with Kathy Desmond, October 11, 1991.

[61] Nakahara, Larry, HDOA-PQ. Telephone conversation with Susan Miller, February 18, 1992.

[62] Figures derived from personal communication between Ron Walker, DLNR-DOFAW, and Susan Miller, February 13, 1992; telephone conversation between Walker and Miller, February 14, 1992; and B&F, Supplemental Budget Requests, 1991.

[63] This section is based on a memo from Bill Devick, DLNR-DAR to Susan Machida, February 10, 1992.

[64] This section is based on an interview of George Komatsu and George Kitaguchi, DOH-VCB, by Susan Miller, May 13, 1991; and relevant statutes and regulations cited in Appendix B.

[65] A vector is defined as an organism, usually an insect or other arthropod, rodent or other animal, capable of transmitting the causative agents of human disease or affecting public health and well-being.

[66] This section is based on an interview of Tim Ohashi, USDA-ADC, by Susan Miller and Jodi Bailey, May 8, 1991; and review comments of The Alien Pest Species Study, Draft Three, by Ohashi, 1992.

[67] This section is based on an interview of George Markin, USFS-Research Laboratory, by Susan Miller and Jodi Bailey, January 30, 1991; and review comments of The Alien Pest Species Study, Draft Three, by Cliff Smith, UH-CPSU, 1992.

[68] Smith, Cliff, UH-CPSU. Telephone conversation with Susan Machida, April 16, 1992.

[69] Scowcroft, Paul, USFS. Telephone conversation with Susan Machida, February 10, 1992.

[70] This section is based on a telephone conversation of Roy Cunningham, ARS, with Susan Machida, March 27, 1992; ARS, Pilot Test of an Integrated Pest Management Zone, 1989; ARS, Pilot Test of the Sterile Insect Technique, 1989; and ARS, Parasitoid and Sterile Fly Release, 1992.

[71] This section is based on interviews of Dick Wass and Jack Jeffrey, USFS-Hakalau Forest National Wildlife Refuge, by Susan Miller and Jodi Bailey, January 13, 1991; telephone conversation between Jerry Leinecke, USFWS-Hawaiian Island Refuge Complex, and Miller, June 18, 1991; and review comments of The Alien Pest Species Study, Draft Three, by Leinecke, 1992.

[72] Leinecke, Jerry, USFWS-Hawaiian Island Refuge Complex. Review comments of The Alien Pest Species Study, Draft Three, 1992.

[73] This section is based on an interviews of Ron Nagata, NPS-HALE, by Susan Miller and Jodi Bailey, February 6, 1991; Dan Taylor and Tim Tunison, NPS-HAVO, by Miller and Bailey, January 30, 1991; and review comments of The Alien Pest Species Study, Draft Three, by Nagata, Charles Stone, NPS-HAVO and Lloyd Loope, NPS-HALE, 1992.

[74] This section is based on an interview of Ron Nagata, NPS-HALE, by Susan Miller and Jodi Bailey, February 6, 1991; a facsimile transmission from Nagata to Susan Machida, April 27, 1992; and review comments of The Alien Pest Species Study, Draft Three, by Nagata, 1992.

[75] Stone, Charles, NPS-HAVO. Review comments of The Alien Pest Species Study, Draft Three, 1992.

[76] Loope, Lloyd, NPS-HALE. Review comments of The Alien Pest Species Study, Draft Three, 1992.

[77] This section is based on an interview of Allen Allison, BPBM, by Alan Holt, January 23, 1992; and correspondence from Robert Cowie, BPBM, to Susan Machida, April 13, 1992.

[78] This section is based on correspondence from Alan Holt, TNCH, to Susan Machida, February 4, 1992.

[79] This section is based on correspondence from Asher Ohta, HSPA, to Susan Machida, February 18, 1992.

[80] This section is based on meeting minutes of the Melastome Action Committee, January 15, 1992.

[81] This section is based on a memo from Wallace Doty, Jr., FCC, to Susan Machida, February 20, 1992.

[82] This section is based on correspondence from Pamela Burns, HHS, to Susan Machida, February 12, 1992 and April 24, 1992.

[83] This section is based on correspondence from Charlotte Wells, MHS, to Susan Machida, March 6, 1992 and April, 1992.

Chapter 5

[84] Beardsley, Introduction of Arthropod Pests, 1979; and facsimile transmission from Ron Heu, HDOA-PPC to Susan Machida, March 17, 1992.

[85] Heu, Ron, HDOA-PPC. Facsimile transmission to Susan Machida, March 17, 1992.

[86] Wester, Alien Flowering Plants, *in press*.

[87] Ohta, Asher, HSPA. Personal communication with Kathy Desmond, October 16, 1990.

[88] Piianaia, Statement before the Senate Committee on Governmental Affairs, June 5, 1991.

[89] Loope, Lloyd, unpublished report, (n.d.).

[90] Hawaii Audubon Society, Hawaii's Birds, 1989.

[91] Loope, Lloyd, NPS-HALE. Personal communication with Alan Holt, (n.d.).

[92] Heu, Ron, HDOA-PPC. Facsimile transmission to Susan Machida, March 17, 1992.

[93] Wong, Lyle, HDOA-PID. Correspondence to Jodi Bailey, November 7, 1991.

[94] This section is based on an interview with Creighton Goldsmith and Jean Thomas, U.S. Customs, by Susan Miller and Jodi Bailey, October 9, 1991.

[95] HDOA, Report to the Fifteenth Legislature, 1989.

[96] Nakahara, Larry, HDOA-PQ. Interview with Susan Miller and Jodi Bailey, January 15, 1991.

[97] Nakahara, Larry, HDOA-PQ. Telephone conversation with Jodi Bailey, February 25, 1991.

[98] USDA, Inspection of First Class Mail in Hawaii, 1991.

[99] Mack, Catalog of Woes, 1990.

[100] HDOA, Report to the Fifteenth Legislature, 1988.

[101] Cooper, Neil. Personal communication with Alan Holt, (n.d.).

[102] Based on a bill for an "Alien Species Prevention and Enforcement Act of 1992" that was recently introduced in Congress by Senator Daniel Akaka. The bill establishes a framework for the imposition of civil and criminal penalties. The bill proposes a standard for federal criminal violations of four federal acts in which misdemeanors and felonies would each have a common set of fines and/or imprisonment as penalties. In addition, each act would include language establishing additional penalties in cases where illegal importation resulted in pecuniary gain to the importer or pecuniary loss to others.

[103] Schwind, Paul, HDOA. Telephone conversation with Susan Miller, March 27, 1992.

[104] See Howarth, Classical Biological Control, 1991.

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Appendices

Appendix A Hawaii's Unique Natural History: Why Is Hawaii so Vulnerable to Alien Pest Invasion?

To understand why Hawaii is particularly vulnerable to alien pests, it is important to consider the natural history of the islands.

Seventy Million Years of Isolation

One of the most isolated places on earth, Hawaii was a difficult place for plants and animals to reach before human travel to the islands. For millions of years before the first people arrived, the primary means of dispersal to Hawaii was hitching a ride on birds, the tradewinds and ocean currents. Two thousand miles of open ocean prevented most predators and large animals, especially mammals, from reaching Hawaii and kept the number of species competing for habitat low.

Hawaii offered these colonizing species an incredibly wide range of habitats in which to evolve new forms—from coastal deserts to lush rain forests to snow-capped peaks. With relatively few competing species and a wide range of habitats to exploit, Hawaiian species evolved into new forms suited to the varied environment. As new islands arose from fresh volcanic activity, some species established on one island "hopped" to the new land and, in many cases, evolved into additional new forms restricted to that particular island. In some groups of organisms, distinct species formed where original populations became isolated in different valleys, further accelerating the evolution of uniquely Hawaiian animals and plants. Hawaii has a remarkably unique flora and fauna. Over 90 percent of our native plants, birds and invertebrates—estimated to total at least 10,000 distinct species and varieties—are found nowhere else in the world—i.e., they are "endemic" to Hawaii.

In this island environment, Hawaii's native species gradually lost many of the common defense mechanisms found in their mainland counterparts. Without any hoofed mammals to defend against, Hawaiian thistles, briars and blackberries gradually lost their tough thorns and stinging hairs. Many birds and insects lost their ability to fly; apparently, these defenses simply were not needed. New species continued to arrive, but at the slow rate of once every several thousand years. With each new arrival, the islands had time to adapt and to assimilate the new member into the native ecosystem.

The Invasion of Alien Species

With the arrival of man some 1,400 years ago, new species began to reach the islands at a much more rapid rate and the "game rules" of survival in the island changed dramatically. Plants and animals brought to Hawaii by man were no longer held in check by the natural predators, parasites and competitors of their native homelands. Released in Hawaii, many of these aliens flourished. The first humans flourished, too, with no dangerous predators, no biting insects (except those that stowed away on their canoes), and few virulent diseases to harm them or their domesticated crops.

The arrival of Europeans and Asians in the late 18th and 19th centuries greatly accelerated the alien species invasion. Just as the introduction of continental diseases like smallpox had devastating effects on the Hawaiian people during this time, so did introduced mammals, plants, insects and diseases wreak havoc on the native plants and animals. The steady growth of alien species problems, from the demise of native people, birds and forests, to the increasing intensity of the battle to protect agriculture from a flood of new pests, is a result of this unique natural history.

Further Reading:

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Appendix B Enabling Legislation and Regulations

Note here: Annotations below are brief and are intended for general information and not for citation. Refer to specific laws or regulations for exact language and details.

Note: Because fines and imprisonment for various categories of criminal offenses are set by judicial statutes and are simply repeated in the following statutes and regulations, the fine amounts and prison terms are given here unless fine and/or prison terms are different from amounts shown below.

- *Petty misdemeanor: fine not to exceed $500 and/or prison term not to exceed 30 days.*
- *Misdemeanor: fine not to exceed $5,000 and/or prison term not to exceed one year.*
- *Class C felony: fine not to exceed $5,000 and/or prison term not to exceed five years.*

Federal Agencies

U.S. Customs Service, U.S. Department of the Treasury

Statutes:

Tariff Act of 1930, as amended [19 U.S.C. §1401 et seq.]
Referenced sections are Title III — Administrative Provisions. Authority of Customs to act for other agencies appears in the laws and regulations applicable to those other agencies.

Regulations:

"Customs Duties" [19 CFR (various sections)]
See also under U.S. Postal Service regulations

U.S. Department of Interior, Fish and Wildlife Service, Law Enforcement Division

Statutes and Treaties:

Convention on International Trade in Endangered Species of Wild Fauna and Flora [TIAS 8249]
Commonly referred to as "CITES". International vehicle for controlling trade in species considered by signatory nations to be threatened with extinction. Three appendices provide protection to such species: one lists species whose existence is or may be threatened by trade; another lists species whose existence is not now threatened by trade but may be if trade is not regulated; the third lists species protected by national law but whose continued existence requires international cooperation. A designated "Management Authority" within the government of each party issues (or may waive) and monitors permits and certificates for export, import, and re-export of any species listed under a CITES appendix. Signatory nations are required to enforce CITES provisions but the means (penalizing trade and/or possession, as well as confiscation and/or return to country of origin) are left to the signatory party. Any signatory may reserve right not to be governed by the Convention in regard to any listed species. Signatories meet biennially; there is a CITES Secretariat under UNEP. 112 nations are signatories to CITES as of 31 January 1992.[1] Treaty entered in force 7/1/75.

Endangered Species Act of 1973, as amended [16 U.S.C. §§1531-43]
Commonly referred to as "ESA". Purposes of Act are to conserve ecosystems upon which endangered species and threatened species depend, to provide programs for conservation of such species, and to provide basis for activities needed to implement CITES and other international treaties for conservation of species. Among the provisions of the Act are: criteria and process for designating endangered species and threatened species, for developing recovery plans and for establishing "critical habitat" areas for such species; cooperative agreements leading to funding assistance for states whose species conservation programs meet certain guidelines; and implementation of Congressional policy directing all federal departments and agencies to "seek to conserve endangered species and threatened species and use their authorities to further Act's purposes" by consulting with Interior to ensure that any projects which they authorize, fund, or undertake "is not likely to jeopardize" endangered species or threatened species or to destroy or adversely modify the habitat of such species. Provides for civil penalties [monetary; $500 to $25,000/violation] and criminal penalties [imprisonment (six months to one year) and monetary ($25,000 to $50,000/violation)]. U.S. Departments of Interior and Commerce are implementing agencies.

Independent Offices Appropriation Act of 1952 [P. L. 97-1581, 31 U.S.C. §9701]
Act allowing federal government to establish regulations which set fees for service and "things of value" provided by its agencies.

Lacey Act of 1900 as amended [16 U.S.C. §701 and 18 U.S.C. §§42-44] and Lacey Act Amendments, 1981, as amended [16 U.S.C. §3371 et seq.]
Lacey Act apparently was the first U.S. initiative to limit harmful introductions[2]; it prohibited introduction of "foreign wild animal or bird" (narrowly interpreted to mean only game birds and furbearing mammals but applied to interstate as well as foreign commerce) except by permit and also prohibited certain specific species or other species "declared to be injurious to "agriculture or horticulture." The Lacey Act Amendments extended the Act's protections to all animals and to plants which are indigenous to any U.S. state and (1) are listed under CITES or other international treaties or (2) are listed under state or tribal "endangered species" laws. Provides for civil penalties ($0-$10,000). U.S. Departments of Interior and Commerce are implementing agencies.

Marine Mammal Protection Act of 1972 as amended [16 U.S.C. §1382]
Covers, by definition, any mammal "morphologically adapted to" or "primarily inhabit[ing]" the marine environment, or any part of such mammals. Although the Congressional findings appear to try to balance conservation of such mammals with protection of stocks for interstate commerce, a court has held[3] that the Act is to be administered for the benefit of protected species rather than commercial exploitation. Act establishes a Marine Mammal Commission and a Committee of Scientific Advisors on Marine Mammals. The operating vehicle of the Act is a moratorium on taking or importation of marine mammals, as defined above, or their products, except as the Secretary[4] may issue permits allowing taking for research, display, or commercial use; such permits shall only be issued on the advice of the Commission and Committee mentioned above. The Act also establishes exemptions for subsistence taking of marine mammals by natives dwelling on the Alaskan coast, as well as a process for developing regulations for taking incidental to subsistence activities of people in other regions. Authority for management of species covered by the Act may be transferred to states on certain conditions. Provides for civil penalties ($0-$10,000/violation) for unknowing violations of Act and/or regulations and penalties of $0-$20,000/violation and/or imprisonment for not more than one year for knowing violations.

Migratory Bird Treaty Act as amended [16 U.S.C. §703 et seq.]
Federal law making it illegal to take any action, unless permitted by regulation under this law, with respect to migratory birds covered by U.S.

treaties with Britain, Mexico, Japan, and the Soviet Union. Also makes illegal the transportation or importation of migratory birds (including parts, nests, and eggs) protected by laws of any U.S. state, territory, or district or Canadian province. Violation of this law or referenced conventions is a misdemeanor, except that actions to take any migratory bird for purpose of selling or bartering or offering any such bird for sale or barter are felonies, with penalty of $0-$2,000 and/or imprisonment for not more than two years. U.S. Department of Interior is implementing agency. However, law allows U.S. states and territories to enact laws or regulations not inconsistent with, or more protective than, this Act or referenced conventions.

Regulations:

"Endangered & Threatened Wildlife and Plants" [50 CFR Subparts 17.11 & 17.12 (April 15, 1990)]
Implements Endangered Species Act of 1973, as amended (ESA). Subpart 17.11 names all species of wildlife determined under the ESA to be endangered or threatened as of this date, while subpart 17.12 gives the same information for plants. Additions or deletions to these lists are made by publication of final rules in the Federal Register.

"Endangered Species Convention" [50 CFR Part 23, FWS/LE ENF 4-REG-23 (revised 6/1/88)]
Implements Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and applies to species listed on three Appendices. Lists countries party to CITES and species on each Appendix as of date. Prohibits importation from any foreign country, or exportation/re-exportation from the U.S. of any wildlife or plants listed on any of the three Appendices, or importation into the U.S. of any wildlife or plant listed on Appendix I or II taken from the sea beyond any country's jurisdiction, unless all requirements for domestic and foreign permits have been met or unless specified exemptions apply. Provides procedures for public participation and Federal agency consultation in developing U.S. negotiating positions in CITES' Conferences of Parties.

"Importation, Exportation, and Transportation of Wildlife" [50 CFR Part 14, FWS/LE 4-REG-14 (revised 11/27/87)]
Implements portions of all statutes and treaties listed above. Purpose is to provide "uniform rules and procedures for the importation, exportation, and transportation of wildlife"[5] to and from the U.S. Provides for: designation of approved ports of entry and exit; inspection and clearance requirements; import and export declarations; marking of containers, import/export licenses; and standards for transport of wild animals and birds.

"Injurious Wildlife" [50 CFR Part 16, FWS/LE ENF 4-REG-16 (revised 12/6/82)]
Implements Lacey Act [? and Lacey Act Amendments?]. Declares injurious or potentially injurious certain species of wild mammals, wild birds or their eggs, amphibians or their eggs, and reptiles or their eggs as well as live or dead fish, mollusks and crustaceans, or their eggs, and prohibits importation, transportation, or acquisition of these species within or into the U.S. Certain exemptions from these prohibitions are given for specimens free of certain diseases, for federal agencies importing or transporting live wildlife solely for their own use, and for dead natural-history specimens for museum or scientific purposes. Provides (unless required by other CFR provisions) that all other species of these categories may be imported, transported, or possessed for scientific, medical, educational, exhibition, or propagational purposes by written declaration at the port of entry but may not be released into the wild except by a State agency having jurisdiction over the release area or persons having permits from such agencies. Also provides criteria and application procedures for Director of U.S. Fish & Wildlife Service to issue permits for importation, transportation and possession of species listed as injurious if specimens are for zoological, educational, medical, or scientific purposes.

Plant Protection and Quarantine Branch, Animal and Plant Health Inspection, U.S. Department of Agriculture

Statutes:

Agriculture Department [P.L. 87-718, 7 U.S.C. §450]
Authorizes Secretary of Agriculture to enter into cooperative agreements for enforcement and administration of Federal laws for control or eradication of plant and animals diseases and pests with State agencies charged with administration and enforcement of State laws in these areas

Agricultural Marketing Act of 1946 as amended [7 U.S.C. §1622]
Lists among duties of Secretary of Agriculture the following: inspection and certification of agricultural products in interstate commerce, including assessment of fees to cover services and penalties of not more than $1,000 and/or not more than one year in prison for falsely representing that products have been inspected

Animal Industry Act as amended [21 U.S.C. §114a]
Authorizes Secretary of Agriculture, in cooperation with States (including their political subdivisions), farmers' associations, and individuals if the secretary so chooses, to control and eradicate any communicable disease of poultry or livestock whose presence is considered an emergency; authorizes payment of claims arising from destruction of animals or materials in the course of the eradication or control.

Animal Quarantine Act as amended [21 U.S.C. §§102-105,111]
Authorizes Secretary of Agriculture (hereafter "Secretary") to hold in quarantine ruminants and swine and to possess facilities and appoint such staff as are needed to maintain facilities and execute this law. Prohibits importation of such animals except through quarantine ports designated by the Secretary with approval of Secretary of the Treasury (Customs). Authorizes Secretary to cause destruction of such animals either infected with contagious disease, or exposed to such disease in manner as to make animal a threat to other animals and authorizes payment for latter. Prohibits importation of diseased ruminants or swine, or such animals exposed to disease within 60 days of importation. Provides that animals mentioned above shall be carefully inspected by "a suitable officer" before import occurs and may be inspected before export. In addition, any materials associated with infected imported specimens shall be destroyed or disinfected, and any ship to be used for export may be disinfected. Violation of any of these provisions is a misdemeanor; in addition, the Secretary may assess a civil penalty of not more than $1,000.

Establishment of International Animal Station as amended [P.L. 91-239, 21 U.S.C. §135]
Permits Secretary of Agriculture to establish such a station on an island as a place where animals which would otherwise violate the quarantine laws may be brought into the U.S. and moved from there to other parts of the country under such regulations as the Secretary may issue. [§§21 U.S.C. 135a and 135b provide for criminal and civil penalties for violating regulations concerning import to and transfer from the station.]

Federal Noxious Weed Act of 1974 as amended [7 U.S.C. §§2801 et seq.]
Regulates "transactions in, and movement of" noxious weeds which are defined as plants of foreign origin, new or not widely distributed in the U.S., which can directly or indirectly affect interests of agriculture, navigation, or fish and wildlife resources. Prohibits moving a noxious weed identified in regulations into or within the U.S. without permit issued by Secretary of Agriculture (unless from Canada). Allows Secretary to refuse to issue permit. Makes such movement or advertisement of such plants unlawful. Allows Secretary to establish quarantine, other inspection regulations, and allowable measures (including destruction, export, or return to point of origin if no less drastic measures available) to prevent dissemination of noxious weeds. Allows for cooperative agreements with political jurisdictions, private organizations, and individuals to carry out foregoing. Provides for search and seizure without warrant of moving persons, goods,

and conveyances, and search with a warrant of premises, to stop dissemination of noxious weeds. Knowing violation of movement prohibitions or quarantine, or their implementing regulations is misdemeanor.

Federal Plant Pest Act, as amended [P.L. 85-36, 7 U.S.C. §§147a, 150bb, 150dd-150gg]
Authorizes Secretary of Agriculture to control and eradicate plant pests, including cooperation with State and foreign governments. Defines plant pest and State (latter includes territories and possessions of the U.S.) Authorizes appropriations, fees for services, and late penalties. Requires general or specific permits to import or move interstate any plant pest. When a new plant pest threatens agriculture or other plants within the U.S., the Secretary is allowed to declare an emergency and, if there is no less drastic action which will be adequate to prevent dissemination of the new pest, seize, destroy, etc. suspected plant material, quarantine and/or disinfect any place or materials associated with such plant pests, or require owner of such plants and or facilities to do the same without compensation. Authorizes promulgation of regulations to implement the foregoing if such regulations are not authorized under the Plant Quarantine Act. Gives authority to any properly identified employee of USDA to stop and inspect, without a warrant, persons, transportation vehicles, or containers moving into or within the U.S. to determine whether they are carrying or are infested with any plant pest subject to this law and, with a warrant, search any premises to make inspections and seizures under this Act. Violations of permit requirements are misdemeanors. Civil penalty of not more than $1,000 may be assessed.

Imported Meat Act as amended [P.L. 85-867, 19 U.S.C. §1306]
Authorizes Secretary of Agriculture to prohibit, upon notification to the Secretary of the Treasury and the public, importation of ruminants or swine, or parts of same, from countries where rinderpest (foot-and-mouth) disease exists. Exempts wild ruminants or swine imported, under conditions set by the Secretary, for zoological purposes. Does not apply to importations from Canada under certain conditions. Authorizes Secretary to promulgate rules and regulations for implementation of Act.

Livestock and Poultry Diseases as amended [P.L. 87-518, 21 U.S.C. §§134a-134d, 134f]
Gives Secretary of Agriculture and USDA employees same types of authority as previous Act over introduction or dissemination of animal (except human) communicable diseases affecting or potentially affecting livestock or poultry. [§134e provides for criminal (fine not more than $5,000 and/or imprisonment for not more than one year) and civil (not more than $1,000) penalties and injunctive proceedings.]

National Environmental Policy Act as amended [P.L. 91-190, 42 U.S.C. §§4331, 4332]
Commonly referred to as "NEPA". Cited sections are "Congressional declaration of national environmental policy" which includes attaining the fullest range of beneficial use of the environment without risk to health or safety, and "[c]ooperation of agencies; reports; availability of information; recommendations; international and national coordination of efforts."

Plant Quarantine Act as amended (also known as Nursery Stock Quarantine Act) [7 U.S.C. §§151 et seq.]
Requires permit issued by Secretary of Agriculture plus certification of freedom from injurious plant diseases and insect pests by country of origin for importation of nursery stock (defined); discretionary exceptions including importation for experimental or scientific purposes by USDA. Mandates Secretary of Treasury [Customs] to notify Secretary of Agriculture of arrival of foreign nursery stock and importer to notify Secretary of Agriculture (or, if directed, appropriate State or Territorial official) of the same. Interstate transfer forbidden until stock has been inspected by an appropriate State or Territorial official. Provides for interstate quarantine and quarantine of localities. Requires marking of packages of imported nursery stock. Allows Secretary to apply same provisions as preceding to plants other than "nursery stock" if necessary. Knowing violations of Act are misdemeanors; unwitting violations may be assessed civil penalty not more than $1,000. Provisions for enforcement, including search and seizure.

Regulations:

"Delegations of authority to the Assistant Secretary for Marketing and Inspection Services" [7 CFR Subpart 2.17]
Authorizes this individual to carry out specified duties of Secretary of Agriculture related to animal and plant health inspection under various federal laws.

"Delegations of authority to the Administrator, Animal and Plant Health Inspection Service" [7 CFR Subpart 2.51]
Authorizes this individual to carry out specified duties of Secretary of Agriculture related to animal and plant health inspection under various federal laws.

"Deputy Administrator, Plant Protection and Quarantine" [7 CFR Subpart 371.2(c)]
Sets forth responsibilities of this individual, under the Administrator, Animal and Plant Health Inspection Service. Lists basic laws authorizing PPQ programs.

"Deputy Administrator, Veterinary Services" [7 CFR Subpart 371.2(d)]
Sets forth responsibilities of this individual, under the Administrator, Animal and Plant Health Inspection Service. Lists basic laws authorizing VS programs.

"Domestic Quarantine Notices" [7 CFR Part 301]
Provides notice of quarantine and regulates interstate movement for: black stem rust; gypsy moth; Japanese beetle; pink bollworm; Mexican, Mediterranean, and oriental fruit flies; citrus and European larch canker; witchwood; imported fire ant; unshu oranges; golden and corn cyst nematodes; and sugarcane diseases.

"Foreign Animal Quarantines" [9 CFR Parts 92, 94, 95, and 96]
Cover, respectively: importation of certain animals and poultry and certain products from same, inspection and other requirements applying to certain means of conveyance and shipping containers; importation prohibitions and restrictions relative to animals and poultry with certain diseases; sanitary requirements for importation of animal byproducts and associated hay and straw; importation restrictions on animal casings.

"Foreign Plant Quarantines" [7 CFR Subparts 319.8, 319.15, 319.19, 319.24, 319.27 and 28, 319.34, 319.37, 319.41, 319.55 and 56, 319.59, 319.69, 319.73 through 76]
Provide notices of quarantine and other regulations relative to the importation, respectively, of: cotton plants and products; sugarcane; plants susceptible to citrus canker and other citrus diseases; plants susceptible to corn diseases; plants susceptible to citrus canker from certain areas of Mexico; certain plants susceptible to certain citrus fruit diseases; bamboo seeds, plants, or cuttings; certain nursery stock, plants, roots, bulbs, seeds and other plant products from certain countries and localities; Indian corn or maize, broomcorn, and related plants; rice, rice straw, and rice hulls; certain fruits and vegetables which are hosts for certain injurious insects, including fruit and melon flies; seeds and other parts of plants resulting from wheat milling processes in certain countries; certain plants and plant products used as packing materials; coffee seeds or beans, products, or plants into Puerto Rico or Hawaii; cut flowers from most foreign countries and islands; certain animal, plant, and manufactured products from countries harboring the khapra beetle; live or dead bees, bee products, and beekeeping equipment from any country except Canada.

"Noxious Weed Regulations" [7 CFR Part 360]
Implements Federal Noxious Weed Act provision that allows Secretary of Agriculture, after public notice and, if requested, public hearing, to designate plant species as "noxious". Contains list as of 1984.

"Territorial Plant Quarantines" [7 CFR Subparts 318.13, 318.30, 318.47, 318.60, and 301.87]
Provide notices of quarantine and other regulations relative to the movement from Hawaii into or through the continental U.S., its territories and possessions of various fruits and vegetables, sweet potatoes, cotton plants and products, and sugarcane.

Animal Damage Control, Animal and Plant Health Inspection Service, U.S. Department of Agriculture

Statutes:

Animal Damage Control Act of March 2, 1931 as amended [7 U.S.C. §§426-426b]
Authorizes Secretary of Agriculture to determine, demonstrate, and promulgate the best methods for eradication, suppression, and control of animals injurious to agriculture, forestry, animal husbandry, wild game, fur-bearing animals, and birds and to apply those methods for eradication or control of such injurious animals. Also provides for protection of domestic animals from rabies carried by wild animals. Allows Secretary to cooperate with States, organizations and individuals and to expend funds to carry out these programs.

Rural Development, Agriculture, and Related Agencies Appropriations Act, 1988 [P.L. 100-202]
Authorizes Secretary of Agriculture to control nuisance mammals and birds and those mammal and bird species which carry disease-causing animal parasites, to enter into agreements with States, organizations, and individuals for such purposes and to collect any monies realized through such agreements.

Regulations:

"Migratory Bird Permits" [50 CFR Part 21, Subpart D]
Sets forth requirement for and application procedures and conditions for depredation permits, which allow holder to take, possess, or transport migratory birds for depredation control purposes. Such permits are obtained from the FWS-LE Special Agent in Charge. Authorizes FWS Director to issue depredation orders for migratory game birds under certain situations and with certain conditions, which include not violating any State laws or regulations applying to the depredating species.

Institute for Pacific Islands Forestry, U.S. Forest Service, U.S. Department of Agriculture

Statutes:

Forest and Rangeland Renewable Resources Research Act of 1978 [P.L. 95-307, 16 U.S.C. §§1641 et seq.]
Authorizes Secretary of Agriculture to implement programs for forest and rangeland renewable resources research. Includes, under "environmental research", the maintenance and restoration of wildlife and fish habitats, and, under "protection research", protection of vegetation and forest resources (including endangered flora and fauna) by biological control methods. Authorizes establishment and maintenance of facilities and cooperation with government and private entities for such purposes.

Regulations:

none located

U.S. Postal Service

Statutes:

Terminal Inspection Act [38 Stat. 1113, 7 U.S.C. §166]
Allows states which maintain "terminal inspection of plants and plant products" at their own expense to submit to the Secretary of Agriculture a list of plants and plant products which State believes should be subject to inspection to prevent the introduction or spread of pests injurious to agriculture. After Secretary approves such list, it is sent to the Postal Service. Makes unlawful and subject to a fine of not more than $100 the mailing of package to that State containing plants or plant products upon such a list without clearly marking the package as to such contents. Postal Service is required to turn over packages so marked to State inspectors; if contents of such packages are found to be free of injurious pests and not subject to any Federal or State plant quarantine laws or regulations, the packages shall be forwarded to stated recipient. If found to be infested or in violations of such laws or regulations, State inspector so notifies Postal Service which notifies sender that package will be returned at sender's request and expense or turned over to state officials for disposal. Directs Postal Service to make rules to implement provisions.

Federal Plant Pest Act as amended [P.L. 85-36, 7 U.S.C. §150cc]
Declares nonmailable any type of package containing any plant pest unless accompanied by a permit issued under this U.S.C. chapter.

P.L. 100-574, 39 U.S.C. §3014
Makes nonmailable any plant the movement of which by common carrier has been prohibited or restricted as a result of quarantine by the Secretary of Agriculture, unless such plant has undergone such inspection, disinfection, and certification as to nullify quarantine. Postal Service to provide public notice of such quarantines. Violation is a misdemeanor.

Regulations:

"Importation of plants or plant products by mail" [7 CFR Part 351]
Provides for concurrent action by APHIS, Postal and Customs Service as a means of ensuring "closer inspection" of importations of plants, plant products, and soil of foreign origin subject to quarantines and regulation under the Plant Quarantine Act and Federal Plant Pest Act. Provides for: location of USDA-APHIS inspectors; arrival procedures applying to parcel post or other mail packages of foreign origin, keeping of records of movement of parcels from Customs to and from federal agricultural inspectors and to postal officials; return or destruction of rejected packages.

State Agencies

Hawaii Department of Agriculture

Statutes:

"Department of Agriculture" [Chapter 141, Hawaii Revised Statutes (HRS)]
General authorization for Department to: cooperate and make agreements with other organizations; provide facilities and equipment for quarantine and chemical/mechanical and biocontrol research and eradication; make rules regarding importation, quarantine, and inspection.

Plant Quarantine Branch, Division of Plant Industry, Hawaii Department of Agriculture

Statutes:

"Plant and Non-domestic Animal Quarantine" [Chapter 150A, HRS]
Also known as the "Hawaii Plant Quarantine Law". Establishes conditions and processes for importation of: plants in any stage of development; unprocessed plant products; microorganisms, invertebrates, and vertebrates (except "so-called domestic animal" covered by quarantine provisions of Chapter 142, HRS) in any stage of development; any container in which subject plants, microorganisms, or animals have been transported and any packing materials used in transport. Defines importation. Prohibits importation of soil or items with soil adhering, specified animals and animals generally harmful or potentially harmful to agricultural or natural resources, and live or dead honey bees. Requires Board of Agriculture to maintain for animals and microorganisms: (1) list of conditionally approved (requires permit for import); (2) list of restricted (requires permit for import and possession); and (3) list of prohibited. Any animal not one of these lists is prohibited until Board has reviewed it and placed it on one of the lists.

Also requires Board to maintain lists of restricted (permit for importation) and prohibited plants. All prohibited species may not be possessed, sold, transferred, or harbored with certain exceptions. Establishes procedures for disposition of: plants or articles denied admission; prohibited living creatures imported or possessed; escaped living creatures which were admitted under Department rules. Requires Departmental permit to transport flora and fauna prohibited from intrastate or intraisland movement by rule. Allows Department to establish and enforce "interim" (= emergency) rules concerning importation and intrastate movement of flora and fauna. Authorizes departmental inspectors to enforce chapter and related rules. Sets penalties for violation of chapter and rules — see Appendix C for history and current penalties. Authorizes Department to certify nursery stock export shipments as to pest condition and to issue certificates for intra- and interstate shipments.

Regulations:

"Non-domestic Animal and Microorganism Import Rules" [Title 4, Chapter 71, Hawaii Administrative Rules (HAR)]
Implements Chapter 150A. Provides procedures for permits required for importation of animals and microorganism cultures: application; approval/disapproval by Branch Chief if for species and conditions of import previously acted upon by the Board of Agriculture; review by appropriate subcommittee and advisory committee on plants and animals; submission to the Board. Notice of quarantine of "feral and other non-domestic animals"; lists of conditionally approved (requires permit for import), restricted (requires permit for import and possession), and prohibited animals; bonding required for certain animals. Notice of quarantine of "unrestricted...micro-organisms"; same three categories of lists as for animals.

"Plant Export Rules" [Title 4, Chapter 73, HAR]
Implements Chapter 150A. Provides for and sets fees for following services that will allow export plant and plant products to meet requirements of state or country of destination: inspection and certification; fumigation; burrowing nematode testing; and nursery certification.

"Plant Import Rules" [Title 4, Chapter 70, HAR]
Implements Chapter 150A. Provides for import restrictions or prohibitions on specific plants in order to minimize risk of introduction and establishment of diseases, insects, and other pests destructive to the State's agricultural industries and forest resources. Details procedures for: introduction of plants requiring quarantine; approving and operating quarantine facilities; duration of quarantine; and disinfestation treatments. Sets import service fees. Provides notice of quarantine and specifies species/genus and import

permit requirements for plants determined by the Board of Agriculture to be subject to these rules.

"Plant Intrastate Rules" [Title 4, Chapter 72, HAR]
Implements Chapter 150A. Provides for restrictions or prohibitions on the intrastate transportation of plant pests and their plant or commodity hosts to prevent establishment and spread of such pests in agriculture, horticulture, and forest lands on uninfested island or island localities. Details inspection requirements and prohibits transport of an uninspected commodity or untreated, infested commodity. Provides examples of regulated pests and restrictions on: transport of specific plants with specific pests; transport of soil, sand, and animal manure; and on harboring, rearing, or breeding of pest.

Plant Pest Control Branch, Plant Industry Division, Hawaii Department of Agriculture

Statutes:

"Department of Agriculture" [Chapter 141, §§3-3.6, HRS]
Authorizes Department to establish rules for criteria and procedures for designating pests for control or eradication. Directs Department to assist, without costs to individuals, in control or eradication of pests (including noxious weeds) "injurious to vegetation of value", including provision of biocontrol agents. Permits adoption of emergency rules for eradication of pests. Directs Department to develop detailed control or eradication program for any designated pest; requires use of "best available technology...consistent with state and federal law." Permits entry onto private property after notice for purposes of control or eradication, whether or not landowner or occupier consents.

"Noxious Weed Control" [Chapter 152, HRS]
Authorizes rulemaking by Department to: establish criteria and procedures for designation of plants as noxious weeds; establish procedures and conditions for cooperative agreements for purposes of eradicating or controlling infestations of noxious weeds; and control or eradication of noxious weeds when such action is deemed economically feasible. Authorizes designation of certain plant species as noxious weeds and requires publication of list of such designated species. Permits Department to declare entire State, an island, or a portion of an island as free or "reasonably free" of specific noxious weed and makes it unlawful to introduce or transport the specific weed into areas so declared. Establishes duties of Department relative to noxious weed control and eradication.

"Seeds" [Chapter 150, HRS]

Also known as "Hawaii Seed Law". Designates Department as official seed certifying agency for the State. Provides for regulation of sale of seeds by: specifying label information; banning false or misleading advertising; establishing tolerances for amounts of noxious weed seeds in sale packages; and setting time limits for applicability of germination tests. Permits Department agents to obtain test portions of seed lots for sale, authorizes Department to cooperate with USDA and others in seed law enforcement, establishes testing procedures, and requires maintenance of a Departmental laboratory for such testing. Requires licenses for importation and sale of seeds. Violations of chapter or applicable rules punishable by fine of $100-$1,000 for first offense and $1,000-$5,000 for subsequent offenses. Establishes revolving fund to support cultivation, production, and research on cultivation and development of seeds administered by the University of Hawaii College of Tropical Agriculture and Human Resources. Chapter references Federal Seed Act (7 U.S.C. §§1551-1610).

Regulations:

"Noxious Weed Rules" [Title 4, Chapter 68, HAR]

Implements Chapter 152. Each plant species designated as noxious weed for eradication and control purposes must meet all five designation criteria: reproductive characteristics; growth characteristics; detrimental effects; control; distribution and spread. Establishes procedure for designation of noxious weeds and for designation of an area (locality, island, group of islands, or entire State) as relatively free of a specific noxious weed; both types of designation must be approved by the Board of Agriculture. Defines four forms of cooperative agreements for purposes of initiating noxious weed eradication or control projects and establishes procedures for such initiation. Specifies that eradication projects must be limited to incipient infestations of noxious weeds on an island (or portion) designated as relatively free from that species, while control projects may be applied to widespread established infestations but only on and within land used or zoned for "agriculture, horticulture, aquaculture, livestock production, forestry, recreational areas, or conservation districts." Lists plants designated as noxious weeds under this chapter as of December 1, 1978. *Note bene: public hearings for revisions of this HAR chapter were held in March and April 1992.*

"Seed Rules" [Title 4, Chapter 67, HAR]

Implements Chapter 152. Establishes criteria for seed analyses and certification. Lists noxious weeds, "primary noxious weeds", and "secondary noxious weeds" and establishes allowable tolerances for levels of these types of seeds in agricultural or vegetable seeds being sold in the State. Provides labeling requirements. Establishes charges for purity analysis and

germination tests. *Note bene: public hearings for revisions of this HAR chapter were held in March and April 1992.*

Animal Industry Division, Hawaii Department of Agriculture

Statutes:

"Animals, Brands, and Fences" [Chapter 142, Part I, HRS]

Authorizes the Department to make rules (applicable at time of introduction to State or any later time) regulating inspection, quarantine, disinfection, or destruction of animals, premises and anything used in connection with animals. These rules may include those governing control and eradication of transmissible animal diseases and the intrastate transportation of animals. Also authorizes the Department to prohibit importation (foreign, inter- and intrastate) of animals infected with or exposed to any transmissible disease. Prohibits entry of domestic animals without inspection and issuance of a permit (after quarantine if necessary); requires all animals entering state to have health certificate. Requires captain of any aircraft or vessel transporting any live animals to so notify Department upon arrival. Animals known to have been exposed to or infected with transmissible disease may be quarantined or destroyed by the Department at any time. Penalties (where not otherwise specified in chapter) depend upon the frequency and seriousness of violation and range from misdemeanor to class C felony. Penalty for knowing of and not reporting a diseased animal is $25-$500. Authorizes Department to cooperate with USDA in programs to eradicate transmissible animal diseases. Provides for dealing with various such diseases, including a revolving fund to support state purchase and provision of remedies for the control and suppression of such diseases. Provides enforcement mechanisms.

Inspection and Quarantine Branch, Animal Industry Division, Hawaii Department of Agriculture

Regulations:

"Dogs, Cats, and Other Carnivores" [Title 4, Chapter 29, HAR]

Provides for and implements program to prevent introduction of rabies into the State by means of a 120-day quarantine of cats, dogs, and other carnivores entering the State.

Livestock Disease Control Branch, Animal Industry Division, Hawaii Department of Agriculture

Statutes:

"Animals, Brands, and Fences" [Chapter 142, Part I, HRS]

See above

"Animals, Brands, and Fences" [Chapter 142, Part II, HRS]
Provides that any livestock being sold or transported shall be accompanied by certificate provided by owner describing animal and naming seller, buyer origin, and destination; copy of such certificate to be filed with Department.

Regulations:

"Cattle, Sheep, and Goats" [Title 4, Chapter 16, HAR]; "Horses" [Title 4, Chapter 23, HAR]; "Non-domestic Animals" [Title 4, Chapter 20, HAR]; "Poultry and Birds" [Title 4, Chapter 19, HAR]; "Swine" [Title 4, Chapter 17, HAR]
Each of the regulations above provide for the import and export of, and control of diseases by means of quarantine among, the named animals.

Vector Control Branch, Environmental Health Services Division, Hawaii Department of Health

Statutes:

"Nuisances; Sanitary Regulations" [Chapter 322-1 through 322-4, 322-6, HAR]
Authorizes Department to investigate all nuisances (such as "foul or noxious odors,...water in which mosquito larvae exist...") and all causes of sickness or disease, either on shore or on vessels, and cause their abatement, removal, destruction, or prevention. Authorizes entry into premises for such purposes, including issuance of warrant if needed. Requires sheriff and all police officers and physicians to report any "nuisance injurious to public health."

Regulations:

"Vector Control" [Title 11, Chapter 26, HAR]
Establishes minimum standards for inspection and abatement of vectors (defined as "an organism...capable of transmitting the causative agents of human diseases or affecting public health and well being") for purposes of preventing epidemics, establishment of new vector species, and vector nuisances. Violation of chapter is misdemeanor. Subchapters deal with provisions for controlling flies, mosquitoes, rodents, and other miscellaneous vectors. Provides for disinfection of aircraft at the discretion of the Department director.

Wildlife Program, Division of Forest and Wildlife, Hawaii Department of Land and Natural Resources

Statutes:

"Conservation of Aquatic Life, Wildlife, and Plants" [Chapter 195D, HRS]
Referred to as State's endangered species act. Finds that State needs to take "positive actions" to enhance the survival of indigenous aquatic life, wildlife, and land plants, including their habitats, because of impacts of human use and disturbances of native ecosystems. Authorizes Department to investigate such organisms to determine their needs for conservation and to adopt rules covering "taking, possession, transportation, importation, exportation, processing, selling, or offering for sale, or shipment of any such organisms" to further their conservation. Makes it unlawful to take any of the preceding actions except as specified in such rules. Establishes procedures for State listing of species as endangered or threatened. Authorizes Department to undertake such programs, including land acquisition, as are necessary to conserve indigenous organisms and to encourage other State and Federal agencies to do the same. Authorizes Department to enter into agreements with Federal and county governments for proposes of chapter. Provides for enforcement, search and seizure, and penalties; latter are misdemeanors punishable by fines ranging from $250-$1,000 and/or one year's imprisonment. In addition, fines of $500/specimen (for a threatened species) and $1,000/specimen (for an endangered species) are required for intentional or reckless killing or removal from original growing place.

"Wildlife" [Chapter 183D, HRS]
Authorizes Department to: manage and administer the wildlife and wildlife resources of the State, including enforcement of all laws relative to "protecting, taking, hunting, killing, propagating, or increasing" wildlife (in State-controlled waters as on land); import and disseminate wildlife, including game "for the purpose of increasing the food supply of the State; manage and regulate all game management areas, public hunting areas, and wildlife sanctuaries; and destroy predators harmful to wildlife. Establishes penalties for violation of certain sections as petty misdemeanors and of other sections as misdemeanors ($100-$1,000 fine and/or up to one year's imprisonment). Authorizes Department to itself take, or give permits for taking, wildlife for scientific, educational, or propagation purposes. Directs Department to cooperate with appropriate agencies of the Federal government to accomplish the purposes of the chapter; includes cooperation for implementation of Pittman-Robertson Act. Other provisions cover hunting in general, including permits, and establishment and hunting of game birds and game mammals.

Regulations:

"Crop Damage, Nuisance, and Health Hazard Permits" [Title 13, Chapter 124-7, HAR]

Implements provisions of Chapter 183D regarding permits; purpose of rules is to "manage and protect indigenous wildlife, endangered and threatened wildlife and plants, and introduced wild birds." Provides processes and conditions for issuing permits for: scientific, propagation, and educational purposes; transport; keeping indigenous wildlife and introduced wild birds; abating crop damage, nuisance, and health hazards.

"Rules Regulating Game Mammal Hunting" [Title 13, Chapter 13-123-11, HAR]

Section lists certain declared game mammals which may be hunted, so long as hunter has license and meets other provisions (bag limits, seasons) of Chapter, including feral pig, Axis deer, Columbian black-tailed deer, feral goat, and mouflon, feral, and mouflon-feral hybrid sheep.

Endnotes

[1] U.S. Department of Interior. Fish and Wildlife Service. 1992. Box Score: Listing and Recovery Plans. *Endangered Species Technical Bulletin*. Vol. XVI:9-12, p. 16.

[2] Juliane Kurdila. Note, The Introduction of Exotic Species into the United States: There Goes the Neighborhood!. 16 B.C. Environmental Affairs Law Review, p. 95. referenced in Bederman. International Control of Marine "Pollution" by Exotic Species. 18 Ecology Law Quarterly, p. 691.

[3] Committee for Humane Legislation, Inc. v. Richardson, 1976, 540 F.2d 1141. 176 U.S. App.D.C. 362.

[4] For members of the orders Cetacea and Pinnepedia (other than walruses), this is Secretary of department under which National Oceanic and Atmospheric Administration is operating; for all other marine mammals covered by Act, it is the Secretary of the Interior.

[5] 50 CFR §14.1.

Appendix C Summary of Changes to Hawaii Illegal Importation Penalties

Year Enacted	Amount of Fine		Prison Term	Violation
1927	$25-$100	&/or	≤ 6 mos	Import procedures or illegal importation
1973	$500	&/or	≤ 6 mos	Import procedures or illegal importation
1985	$100-$1,000	&/or	≤ 1 yr	Import animal without permit when one is required; possession or moving of a prohibited or seized animal
	$500	&/or	≤ 6 mos	Any other violations of plant and animal quarantine chapter
1990[1]	≤ $500	&/or	≤ 30 days	Airlines, etc. failure to distribute, collect or submit declaration forms
	≤ $10,000[2]	&/or	≤ 5 yrs	More than three violations of chapter within five years or lack of permit for prohibited or restricted organism
	≤ $1,000	&/or	≤ 1 yr	Any other violations of plant and animal quarantine chapter
1991	≤ $500	&/or[3]	30 days	Airlines, etc. failure to distribute, collect or submit declaration forms
	$1,000-$10,000		none	More than one violation of chapter with five years or lack of permit for prohibited or restricted organism
	$100-$1,000		none	Any other violations of plant and animal quarantine chapter
1992[4]	$100-$1,000	&/or	1 yr	Airlines, etc. failure to distribute, collect or submit declaration forms
	$500-$25,000	&/or	1 yr	Second violation within five years
	$500-$25,000	&/or	1 yr	Possession or moving of prohibited or seized animal; lack of permit for prohibited or restricted organism
	$100-$10,000	&/or	1 yr	Any other violations of plant and animal quarantine chapter
	$500-$25,000			Second violation within five years

[1] Three categories are classes of criminal action (petty misdemeanor, class C felony and misdemeanor, respectively); fines and prison terms were taken from Chapter 706, HRS, §§640 and 660, respectively.

[2] Since 1990, statute directs court to require payment by violator of an amount sufficient to cover capture, eradication and/or control of the organism.

[3] Statute retains this category as a petty misdemeanor; other categories have fixed fine ranges and no imprisonment penalties.

[4] All categories are misdemeanors; fines are in statute while prison terms are taken from Chapter 706, HRS, §663.

Appendix D Looking for Solutions: The New Zealand Approach

New Zealand shares many characteristics with Hawaii: a large number of unique native species; fragile island ecosystems; an important agricultural industry and distance from many of the noxious insect, weed and disease problems found in continental environments. New Zealand also shares Hawaii's vulnerability to invasive non-native species.

New Zealand has clearly recognized the magnitude of the threat posed by the introduction of pest alien species. As acknowledged in a 1988 report to the Prime Minister reviewing the nation's overall border control strategy, "biological security (plant and animal quarantine) has become at least as important as people security."[1] The report specifically notes that while the danger to public health from biological sources is lower than in earlier times (with the exception of AIDS), the need for plant and animal protection is ever greater.

New Zealand's concern over the continuing invasion of alien species can easily be justified and demonstrated in economic terms. Its timber industry alone (primarily based on planted, non-native trees) was valued at $3 billion (N.Z.) in 1982 with annual sales of $2 billion (N.Z.). "This exotic forest resource is clearly a multi-million dollar economic and social asset capable and worthy of protection against factors that may cause significant loss."[2] In addition, although New Zealand's indigenous forests contribute little in direct revenue to the national purse, officials recognize their value for protecting fragile environments, controlling runoff and providing recreation. Indeed, a serious pest or disease problem in a native beech forest could be of greater longterm significance than a similar problem in a non-native conifer plantation.[3]

The Border Control Systems

Eighteen branches of government have some type of regulatory responsibility at the borders of New Zealand. Many of these measures focus on common clearance and collection activities carried out by New Zealand's Customs officers—e.g., checking of visas and immigration documents, collecting duty on imports, and intercepting illegal drugs and other smuggled goods. The agencies with primary responsibilities

for preventing introductions of unwanted species are the Ministries of Forestry (MOF) and Agriculture and Fisheries (MAF), and to a lesser extent, the Ministry of Health (MOH).

Although a 1988 report suggested that the country lacked a comprehensive, coherent "system" for protecting its integrity, existing mechanisms appear to be relatively effective. On average, one new plant species naturalizes every 88 days for a total of four per year.[4] Between 1984 and 1988, four new insects with potential economic significance established in New Zealand.[5] Hawaii, by comparison, records an average of three new insect species of economic significance each year.

Multiple Lines of Defense

In New Zealand, government agencies have developed an integrated "line of defense" strategy that concentrates on prevention rather than cure, and transfers as much of the risk as possible into the exporting country, away from New Zealand borders. The National Agricultural Security Service is based on pre-entry import requirements, border inspections, post-entry quarantine, disease and pest surveillance, and response to suspected introductions. While MAF also emphasizes prevention in its parallel approach to carrying out border control responsibilities, its forest protection has evolved into a national system that integrates quarantine, early detection and forest health monitoring.[6]

In general, the three primary lines of defense employed in New Zealand are: (1) developing international treaties and other forms of agreement designed to extend protection beyond the border; (2) implementing quarantine and inspection activities upon arrival; and (3) conducting biological surveys, when necessary. These protection and control strategies are linked to a computer database system that serves both MOF and MAF programs.

The First Line of Defense: International Agreements

The first line of defense against unwanted introductions begins not at the points of entry into the country but at the points of origin for goods exported to New Zealand. A signatory to the 1952 International Plant Protection Convention, New Zealand is authorized to regulate entry of plants and plant products to ensure that they are pest-free. Under the terms of the treaty, exporting countries must provide a phtyosanitary certificate for plants and plant materials shipped into New Zealand. The certification must include a description of the cargo, its country of origin (this also applies to re-exports), the botanical name of the plant(s), a declaration that it was treated, and a description of the type of treatment administered. Established to prevent incidental spread of pest species across nation boundaries, the treaty is administered through the Food and Drug Organization of the United Nations. The United States is also a signatory to this treaty, which helps protect Hawaii from foreign sources of new non-native pests.

In addition to this treaty, some of the ministries of the central government with border protection duties and jurisdiction are actively pursuing agreements directly with foreign countries. For example, MAF is currently drafting a special policy on the importation of goods that may serve as a host to unwanted species of fruit flies. The purpose of this policy is to "prohibit the pest not the product."

To implement this policy, MAF proposes a process based on a "Bilateral Quarantine Agreement" (BQA) between quarantine agencies in New Zealand and the exporting country. The BQA would secure agreements from the exporter nation to adhere to a set of standards of tolerable levels of infestation—"a maximum pest limit"—set by New Zealand. Before MAF will enter into an agreement with the export country, it will request a list of pests associated with the product in its country of origin (including diseases, weeds, etc.). MAF will then conduct a "Pest Risk Assessment" to determine the potential impacts that could result from accidental importation of the pest into New Zealand. Based on this assessment, various protective measures may be required; only those consignments that pose the highest risk would require a BQA.

This process illustrates MAF's intent to ensure that imported goods are as "clean" as possible and highlights the direction that future policy decisions are likely to take.[7] Thus far, negotiating BQAs has been very effective in reducing the risk of unwanted introductions, since it transfers the risk away from New Zealand's borders. As a result, the government is expending a considerable amount of effort in this area;[8] and although the draft policy has not been adopted yet, it is likely that some form of this approach will be put into effect.[9]

However, the proposed BQA illustrates that even a sovereign country is limited in its ability to impose requirements. Since international sanitary/phytosanitary standards must be based on scientifically sound and accepted principles, much of the negotiations will involve developing a mutually agreeable set of standards. For example, although one expert view contends that animals effectively vaccinated against rabies will not spread the disease, New Zealand would defend its existing policies requiring quarantine even of vaccinated animals (as would Hawaii). To maintain its policy under a BQA, New Zealand must justify its requirements on a sound technical basis or open itself to valid and strong criticism. This issue is still being investigated.

The Second Line of Defense: Inspection and Quarantine

The second line of defense protecting New Zealand from unwanted alien species is inspection and quarantine. New Zealand authorities strongly believe that since many of the risk items are carried by individuals unaware of the potential dangers, inspectors must be tolerant and understanding yet firm with people who, unknowingly, bring illegal species into the country. The personnel conducting the screening must also be knowledgeable and sensitive to the animal and plant

quarantine issues. As a result, MAF inspectors screen all passengers while Customs officials screen the baggage.

MAF inspectors also physically examine all animals and most plant material, relying in some cases on certification and statistical sampling. If the phytosanitary certificate is questionable, or the cargo is considered suspicious by MAF inspectors, they may require it to be treated—even if it was reported to have been treated prior to arrival.

MOF is responsible for inspections at all ports of entry to prevent accidental introductions of species that might be harmful to the health of forests. Most of its inspections focus on goods and packing material that are potential host material for species of insects, fungi, plants and diseases of trees. MOF inspectors are authorized to examine, seize, hold and even destroy goods and/or packing material that harbor unwanted pests. If they discover an unfamiliar alien species, they may hold the cargo until samples of the organism can be identified. If the species is determined to be a potential pest—a decision usually based on the history of its behavior in its native ecosystem and other places where it has been introduced—the goods can be destroyed, returned to their point of origin or shipped to another country that is willing to accept the cargo.

In addition to the imported goods themselves, MOF inspectors are also concerned with the packing materials and dunnage. Wood and wood products used in dunnage and crating are not always reported on the shipping documents, and their enormous volume makes inspection of all imports (and packaging) for potential forest pests virtually impossible. As a result, MOF inspectors generally take a random sampling of about ten percent of most shipments. In some cases, MOF will adjust its sampling rate to reflect greater potential risks of particular types of cargo. For example, forestry inspectors are particularly concerned with bark-boring insects because they are especially injurious to New Zealand forests. According to their records, MOF intercepted bark beetles on 32 separate occasions; 24 of these originated in North America and 25 were from dunnage.[10] MOF inspection staff consequently adjusted their sampling rates so that the dunnage of goods from the North American countries is sampled more intensively.

The Ministry of Health inspects bulk food items (such as grains) to ensure that the shipments are wholesome and pest-free.

In addition to cargo, passengers and food, New Zealand screens incoming mail for prohibited plant and animal species. Although the main objective is to intercept illegal drugs (dogs are generally used to intercept drugs in letters and small parcels), MAF and Customs staff are stationed at the overseas mail processing areas to examine packages for potential alien species. This work takes place during normal business hours and generally does not delay mail more than 24 hours. In addition, if New Zealand postal service personnel discover any agricultural products, they will notify MAF and release the parcel.

Computer Technology

MOF stores all historic data of species interceptions (location, country of origin and date of interception) in its computerized database—BUGS. In addition, the database contains records of the species' lifestage at discovery, the host material and the species' location within it. This kind of detailed information augments an inspector's personal experience and ensures that available information is easily accessible by all MOF inspectors. The inspection staff can quickly access these records to help identify high-risk cargo by type, country of origin or some other factor. With this information, inspectors can effectively target high-risk items.

MAF also employs database technology to assist with quarantine work. Information obtained from the required shipping documents is entered and stored in the computer. [Note: Unclear if MAF and MOF databases are shared/compatible.]

In addition to using the database for targeting their inspections, MOF staff analyze the computer records to adjust trade agreements with exporting nations under the International Plant Protection Convention. The staff also study economic trends and statistics to identify New Zealand's major trading partners and import products. This information is then used by the science staff to prepare for potential pest species associated with new incoming products and to develop methods to control such pests, if accidentally introduced. Quarantine officers are subsequently briefed about new goods and associated pests they are likely to encounter.

Third Line of Defense: Early Discovery and Action

Even with New Zealand's strict quarantine and inspection regulations, unwanted new species can enter the country. To control the problems associated with these introductions, MOF has adopted a strategy of early discovery and prompt action to protect the resources under its jurisdiction.

MOF monitors New Zealand's forest resources on public and private lands for noxious pests or diseases. When necessary, MOF will design and conduct in-depth surveys to confirm the presence or absence of a particular pest.[11] Information gathered from these surveys, along with records from forest health officers and data generated by the Forest Research Institute, are recorded in a database system known as HEALTH.[12] Database records vary by source and may include the age, size, and stand type of the forest; any pests, diseases, and their treatment; host condition; type of damage; cause of damage; total area infected; and percentage of the trees within an area that are affected.

Contingency Planning

In the event that a new pest species or disease is revealed by the health inspection survey (or some other means), a contingency plan outlines the appropriate course of action. The plan clearly specifies all the practical steps involved in responding to a new alien pest species. Under these plans, MOF responds to significant introductions and is authorized to undertake a number of actions, including establishing a strict

quarantine zone around the area of the infestation, and prohibiting the movement of people and goods out of the area. MOF staff and their equipment must be de-contaminated before leaving a quarantined zone.

In addition, the plans require MOF to maintain fully packed and ready boxes of field equipment—"Blitz Boxes"—with enough supplies to keep two staff members fully equipped to meet most situations for a considerable period.[13] Contingency plans also include procedures for evaluating pest control actions, determining whether plan revisions are needed, and recommending ways to improve staff effectiveness.

Paying the Price: The Cost of Protection

During the 1990-1991 budget year, MOF alone spent approximately $3,370,000 (N.Z.) on its protection programs, $2,380,000 (N.Z.) for import quarantine and $990,000 (N.Z.) for forest health surveys. More than one-half of the cost of these programs is recovered under a "user-pays" policy. (The Ministry anticipated receiving $1.8 million (N.Z.) from inspection fees and $690,000 (N.Z.) from forest owners participating in the health monitoring.) The balance is funded by the government. Emergency control measures are not funded through the regular operating budget. If such funds are needed to eradicate or control incipient outbreaks of pests or diseases, MOF requests an allocation directly from the government.

Learning from New Zealand: Some Things for Hawaii to Consider

One key factor that makes New Zealand's system so effective is the extensive alien species database it has developed over the past 30 years. Assessments also credit the availability of an in-house science staff, capable of conducting research on pest species and identifying new alien pests, as another essential component of the system's effectiveness.

With a computerized database, New Zealand inspectors are able to profile arrivals or target their sampling, rather than conduct random searches on the extensive volume of passengers and cargo entering the country. This strategy allows the ministries to allocate border protection resources as judiciously as possible. While an internal review conducted in 1988 identified a number of weaknesses in border control arrangements, such as an outdated border clearance process, it also pointed out improved performance attributed to new methods, such as the computer-based profiling and data analysis.[14]

As a sovereign nation, New Zealand has greater potential resources and solutions to control the problem of unwanted alien species than does a single, small state within a large nation. Nonetheless, several of New Zealand's programs are relevant and instructive for Hawaii. In particular, Hawaii may benefit from incorporating

database technology similar to New Zealand's as a means of increasing the efficacy of quarantine and inspection procedures. Ministry authorities recognize the relevance of their alien species database, not only for their country, but for others as well, and are willing to make their records accessible to other countries attempting to improve or create their own quarantine and inspection system.[15]

In addition, Hawaii could develop a modified forest health survey similar to New Zealand's, largely based on existing monitoring programs carried out on public lands in the state. While contingency plans for potential brown tree snake, rabies and a few other pest introductions are already in place in Hawaii, this concept could be expanded and modeled after those developed and implemented by MOF. The efforts by MOF and MAF to develop bilateral agreements could also serve as examples for similar arrangements between Hawaii and the continental U.S.

Endnotes

[1] Hensley, Untitled report, 1988.

[2] MAF and MOF, Joint report, 1982.

[3] MAF and MOF, Joint report, 1982.

[4] Timmins and Williams, Reserve Design and Management, 1987.

[5] Hensley, Untitled report, 1988.

[6] Hosking, Exotic Forest Insects, 1987.

[7] Ivess, R.J., MAF. Correspondence, 1991.

[8] Boland, Christopher, MAF. Correspondence to Ilima Pilanaia, January 27, 1992.

[9] Ivess, R.J. Correspondence, 1991.

[10] MAF-Forest Research Institute, Bugs and Health, 1990.

[11] Boland, Christopher, MAF. Correspondence to Ilima Pilanaia, January 27, 1992.

[12] MAF-Forest Research Institute, Bugs and Health, 1990.

[13] MAF, Forest Disease Contingency Plan, 1988.

[14] Hensley, Untitled report, 1988.

[15] Hosking, Exotic Forest Insects, 1987.

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Appendix F List of Acronyms and Initials

ADC	Animal Damage Control, Animal and Plant Health Inspection Service, U.S. Department of Agriculture
APHIS	Animal and Plant Health Inspection Service, U.S. Department of Agriculture
ASAP	Alien Species Alert Program, National Audubon Society, Hawaii State Office
BPBM	Bernice Pauahi Bishop Museum
BTSCG	Brown Tree Snake Control Group
CDD	Communicable Disease Division, Hawaii Department of Health
CFR	U.S. Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPSU	Cooperative Parks Studies Unit, University of Hawaii
B&F	Hawaii Department of Budget and Finance
DLNR	Hawaii Department of Land and Natural Resources
DOD	U.S. Department of Defense
DOFAW	Division of Forestry and Wildlife, Hawaii Department of Land and Natural Resources
DOH	Hawaii Department of Health
EHS	Environmental Health Services Division, Hawaii Department of Health
ESA	Endangered Species Act
FCC	Firetree Coordinating Committee
FSA	Federal Seed Act
GACC	Governor's Agriculture Coordinating Committee

HALE	Haleakala National Park, U.S. National Park Service, U.S. Department of the Interior
HAR	Hawaii Administrative Rules
HAVO	Hawaii Volcanoes National Park, U.S. National Park Service, U.S. Department of the Interior
HDOA	Hawaii Department of Agriculture
HHP	Hawaii Heritage Program, The Nature Conservancy of Hawaii
HHS	Hawaiian Humane Society
HRS	Hawaii Revised Statutes
HSPA	Hawaiian Sugar Planters Association
IPIF	Institute of Pacific Islands Forestry, U.S. Forest Service, U.S. Department of Agriculture
IQB	Inspection and Quarantine Branch, Animal Industry Division, Hawaii Department of Agriculture
LDC	Livestock Disease Control Branch, Animal Industry Division, Hawaii Department of Agriculture
MAC	Melastome Action Committee
MCI	Military Customs Inspectors, U.S. Pacific Command, U.S. Department of Defense
MGF	Moanalua Gardens Foundation
MHS	Maui Humane Society
NAR	Natural Area Reserve, Hawaii Department of Land and Natural Resources
NPS	U.S. National Park Service, U.S. Department of the Interior
NRDC	Natural Resources Defense Council, Honolulu, HI
NRDC-WDC	Natural Resources Defense Council, Washington, D.C.
NWR	National Wildlife Refuge, U.S. Fish and Wildlife Service, U.S. Department of the Interior
PACOM	U.S. Pacific Command, U.S. Department of Defense
PANIC	Planned Action for New Insect Control Committee
PID	Plant Industry Division, Hawaii Department of Agriculuture
PPC	Plant Pest Control Branch, Plant Industry Division, Hawaii Department of Agriculture
PPI	Personal Property Inspectors, Military Customs Inspection, U.S. Pacific Command, U.S. Department of Defense

FPQ	Plant Protection and Quarantine Branch, Animal and Plant Health Inspection Service, U.S. Department of Agriculture
PQ	Plant Quarantine Branch, Plant Industry Division, Hawaii Department of Agriculture
RC&D	Resource Conservation and Development Branch, U.S. Soil Conservation Service, U.S. Department of Agriculture
TNCH	The Nature Conservancy of Hawaii
UH	University of Hawaii
UHCES	University of Hawaii Cooperative Extension Service
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFDA	U.S. Food and Drug Administration, U.S. Department of Health and Human Services
USFS	U.S. Forest Service, U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service, U.S. Department of the Interior
USFWS-LE	U.S. Fish and Wildlife Service-Law Enforcement Division, U.S. Department of the Interior
USPHS	U.S. Public Health Service, U.S. Department of Health and Human Services
USPS	U.S. Postal Service
VCB	Vector Control Branch, Environmental Health Services Division, Hawaii Department of Health

Appendix G **Natural Resources Defense Council**
The Nature Conservancy of Hawaii

Fact Sheets

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Two Case Studies: Non-Indigeneous Species in Hawaii and Florida | 8

In this chapter, OTA focuses on the status, problems, and policies regarding nonmarine, non-indigenous organisms in two particular States: Hawaii and Florida. These two States have large numbers of non-indigenous species (NIS) because of their particular geography, climate, and history. Each has experienced considerable problems as a result. And each area has developed interesting policy responses in the attempt to solve these problems. Their efforts are worth attention in their own right and also because they may provide lessons for other parts of the United States.

Several common themes appear in both States. Invasive NIS threaten the uniqueness of certain areas. In Hawaii, this threat is to the remaining indigenous species, most of which occur nowhere else in the United States or the world. In both States, the greatest threat of NIS is to unusual natural areas as a whole. Both States are transportation hubs and tourist destinations. Therefore, entry and establishment of non-indigenous pests in either State provide a route for further spread into other parts of the United States.

Of course, Hawaii and Florida are very different from each other. Hawaii is the only State subject to a Federal agricultural quarantine that includes comprehensive Federal inspection activities. Many policies affecting Hawaii would be different if California, with its massive agricultural sector, were not nearby. No other State receives as much U.S. military traffic and, thus, needs to pay as much attention to this pathway. Florida is the center for U.S. production of tropical aquarium fish, and few other States have engaged in environmental manipulation on the large scale Florida has.

These two States have learned certain lessons in dealing with harmful NIS:

- Federal and State approaches need to be coordinated;
- seldom do those who are the source of NIS problems also bear their cost;
- agriculture and natural areas bear a high cost for introductions, whatever their source; and
- public education is vital to preventing new species entry and spread.

These lessons are worth the attention of other States, perhaps with less severe problems right now. Also, these lessons are worth the attention of Federal policymakers. The Federal Government has both helped and hindered these States in their efforts to deal with harmful NIS. Better integration of Federal and State policies and programs in the future would benefit both the Nation and the States.

NON-INDIGENOUS SPECIES IN HAWAII

Finding:

Hawaii has a unique indigenous biota, the result of its remote location, topography, and climate. Many of its species, however, are already lost, and at least one-half of the wild species in Hawaii today are non-indigenous. New species have played a significant role in the extinction of indigenous species in the past and continue to do so. Hawaii, the Nation, and the world lose something valuable as the indigenous flora and fauna decline.

The Nature of the Problem

By many measures, the Hawaiian Islands represent the worst-case example of the Nation's NIS problem. No other area in the United States receives as many new species annually, nor has as great a proportion of NIS established in the wild. At the same time, Hawaii, the Nation's so-called extinction capital, has the greatest concentration of threatened and endangered species in the United States and the greatest number of extinct species as well. While habitat destruction has been and continues to be a main factor in the demise of the indigenous biota, NIS[1] have been identified as an important, if not the most important, current threat (27,85,86,128).

In addition, Hawaii may be the State most visibly transformed by NIS. Most of the coastal areas and lowlands of the mountainous islands appear to be the proverbial paradise—green, often lush, replete with birds and flowers. But except in a few pockets, most of the trees, foliage, flowers, and birds are non-indigenous. Only at higher elevations can one find any appreciable expanse of the globally unique flora and fauna.

Non-indigenous species have had a distinctive impact in Hawaii for several reasons.

- **The Island ecology.** The Hawaiian Islands are the most remote land mass in the world, separated from the continents by a 2,500-mile-wide ocean moat. As a result, only a relatively few kinds of plants, insects, birds, and other organisms managed to colonize the islands before human settlement (see "original immigrants" in table 8-1). The original several hundred species that arrived by ocean or air currents evolved into many thousands of species, more than 90 percent of which are endemic (unique) to Hawaii.

  Missing from this assemblage were many of the predators, grazers, pathogens, and other organisms that have shaped the ecology of the continents. Birds, plants, brightly colored snails, and insects dominated the original Hawaiian landscape. Yet there were no ants, mosquitoes, or cockroaches, nor any snakes or other reptiles. The only mammals were a small insect-eating bat and a marine mammal, the Hawaiian monk seal (*Monarchus schauinslandi*).

[1] In Hawaii, alien species is the preferred term.

Table 8-1—Past and Present Status of Nonmarine Species in Hawaii

Group	Original immigrants (number)	Indigenous species (number)	Endemic species (no./%)	Extinct species (no./%)	Threatened/ endangered[a] (no./%)	Established NIS[b] (no./%)
Plants[c]	407	≈1,400	≈1,200/86%	/≈10%	/≈30%	≈900/45%
Birds[c]	21	≈100	92/≈92%	60/≈60	30[a]/≈70%	38/≈48%
Mammal	1	1	0	0	1/100%	19/95%
Reptiles	0	NA	NA	NA	NA	13/100%
Amphibians	0	NA	NA	NA	NA	4/100%
Freshwater fish		5	5/100%	0	0	29/84%
Mollusks[c]	22-24	≈1,060	/≈99%	/≈50%	/100%	≈30/6%
Insects[c]	350-400	≈8,000	/≈98%		/≈30%	≈2,500/≈25%

a Percentage of remaining species, for most cases representing unofficial estimates. As of December 1992, 104 plant species (all but one as endangered) and 30 bird (marine and nonmarine) species and subspecies (all but one as endangered) were on the U.S. Endangered Species List. Another 81 plant species were proposed for listing (all but one as endangered). A total of 189 plant species were slated to be listed by 1993 under a Federal court settlement (Civil No. 89-953 ACK).

b Refers to species non-indigenous to Hawaii. This includes many species originating in the continental United States.

c Numbers for plants, birds, mollusks (mostly land snails), and insects in most categories are rounded estimates based on species lists, other published reports, and expert opinion.

NA = not applicable.

SOURCES: Adapted by the Office of Technology Assessment from W.L. Wagner, D.R. Herbst, and S.H. Sohmer, *Manual of the Flowering Plants of Hawaii* (Honolulu, HI: University of Hawaii Press, Bishop Museum Press, 1990); L.L. Loope, O. Hamann, and C.P. Stone, "Comparative Conservation Biology of Oceanic Archipelagoes," *BioScience*, vol. 38, No. 4, April 1988, pp. 272-282; G.M. Nishida (ed.) *Hawaiian Terrestrial Arthropod Checklist* (Honolulu, HI: Bishop Museum Press, 1987); and personal communications from H.F. James, ornithologist, National Museum of Natural History, Smithsonian Institution, Jan. 23, 1992; W. Devick, aquatic resources specialist, Hawaii Department of Land and Natural Resources, Jan. 7, 1992; M. Hadfield, zoologist, University of Hawaii, Honolulu, Jan. 6, 1992; and F.G. Howarth, entomologist, Bishop Museum, January 1992.

Because they evolved in the absence of any large herbivorous animals like deer, many of the plants lost their physical and chemical defenses against such animals (17). Hawaii's indigenous raspberries (*Rubus hawaiensis*) do not have the sharp thorns of related species. The 50 species of indigenous mints lack the herbivore-deterring aromatic scent of sage (*Salvia officinalis*), basil (*Ocimum basilicum*), and other continental mints. Similarly, more than a dozen species of flightless, ground-dwelling birds (88) evolved on the islands, as did several unusual flightless moths, flies, and other insects (55).

This isolated evolution is seen as the prime reason why Hawaii, and oceanic islands in general, are especially vulnerable to ecological invasions (70). In addition, most indigenous species in Hawaii are not adapted to fire, which has increased considerably with human settlement. This now common physical disturbance not only eliminates indigenous species, particularly rare and threatened or endangered plants, it provides an inroad to invasions by better adapted NIS (109). Trampling by large non-indigenous animals also facilitates invasions.

- The tropical climate. Hawaii's average temperatures vary little between winter and summer, at sea level ranging from about 72 to 78 degrees F. In contrast, rainfall, delivered to the islands by trade winds from the northeast, varies tremendously. Windward mountain slopes can receive 300 to 400 inches per year, while leeward coasts receive as few as 10 to 20 inches.

The variation in rainfall, along with the diverse, volcano-created terrain, accounts for Hawaii's large variety of habitats, which in turn accounts at least in part for the diversity of recently arrived organisms that have successfully colonized the islands (69). And the lack of a killing frost except at high elevations means

that Hawaii is subject to invasion by many species that would not be a threat to the largely temperate continental United States.

- The transportation hub. Lying close to the middle of the Pacific Ocean, Hawaii is a portal between Asia and North America. Traffic through the islands has been increasing dramatically, given the rising economic importance of the Pacific Rim nations and the increasing popularity of Hawaii as a vacation spot. With a 50-percent increase in traffic during the 1980s, Honolulu's airport was 15th busiest in the United States in 1990, according to the Federal Aviation Administration. Equally important is the military traffic through Hawaii, the Pacific center for U.S. defense (see below).

The large volume and variety of traffic is responsible for the great number of NIS that arrive in the State. In addition to stowaways on transport equipment or cargo, plants and animals are brought in, intentionally or unintentionally, by the increasing number of travelers, both residents and tourists.

RATES OF INTRODUCTIONS

The rate of NIS introductions in Hawaii increased dramatically with the start of regular air service to the islands in the 1930s. But Hawaii's transformation by NIS began 1,500 or more years ago, with the arrival of sea-faring Polynesians.

Polynesians intentionally introduced about 30 kinds of plants for cultivation—including sugar cane (*Saccharum officinarum*) and coconut (*Cocos nucifera*), two images closely allied with Hawaiian culture today—and accidentally brought along several weeds. They also brought a few domesticated animals (pigs, dogs, chickens) and stowaways like rats, lizards, and probably several insects. The rate of species becoming established in the islands thus changed from the natural rate of one new species every 50,000 years to three or four new species every 100 years (70).

Hawaii began to absorb a new wave of species with the arrival of Europeans in 1778, when the rate of successful introductions jumped to hundreds of thousands of times the natural rate. Among the most significant and persistent introductions were the goats (*Capra hircus*), sheep (*Ovis aries*), European pigs (*Sus scrofa*), and cattle (*Bos taurus*) released by explorer James Cook and other early ship captains as gifts or to create herds to feed their crews. Feral European pigs and goats in particular remain serious pests of natural areas (and to some extent agriculture) today.

In the subsequent two centuries of European and Asian settlement, horses, deer, and more rodents have also been introduced. More non-indigenous bird species (including 15 game species) have become established in Hawaii than anywhere else (64). More than 4,600 non-indigenous plant species have been introduced, primarily for cultivation. Of these, almost 900 have become established, so that Hawaii's wild non-indigenous plant species today are approaching the number of indigenous species (129). Non-indigenous freshwater fish, most of which were intentionally introduced for sport, food, or other reasons (71), far outnumber the relatively few indigenous freshwater species. In the case of insects, NIS make up perhaps 25 percent (table 8-1). Many of Hawaii's NIS are indigenous to the continental United States; according to the Hawaii Department of Agriculture, about one-quarter of Hawaii's non-indigenous pests are mainland species (47).

Like goats and pigs, many other present-day pest species were deliberate, well-intentioned introductions in the past (table 8-2). Several plants originally brought in for agricultural or ornamental purposes have become extremely invasive, as in the case of strawberry guava (*Psidium cattleianum*) or banana poka (*Passiflora mollissima*). Some animals brought in to control other pests became problems themselves. The Indian mongoose (*Herpestes auropunctatus*), introduced via Jamaica in the 1880s, was supposed to control rats in sugar cane fields, but has come to prey on birds, including the Hawaiian goose (nene, the State bird) (*Branta sandvicensis*), and

Table 8-2—Significant Non-Indigenous Pest Species in Hawaii

Species	Origin	Date introduced	Reason	Impacts
Pig (*Sus scrofa*)	Europe	1778	Gift, food	Damages crops; degrades natural habitats by foraging, trampling; spreads alien plants; causes erosion, harming watersheds
Goat (*Capra hircus*)	Europe	1778	Gift, food	Degrades natural habitat by foraging, trampling; spreads alien plants; causes erosion, harming watersheds
Myna bird (*Acridotheres tristis*)	India	1865	Control armyworm in pastures	Spreads alien plants; damages crops; spreads avifaunal diseases
Cattle egret (*Bubulcus ibis*)	Southern Eurasia, Africa	1959	Control insect pests on cattle	Damages crops, aquaculture; airport hazard; preys on indigenous waterbird chicks
"Fruitfly"	Widespread		Accidental	$300 million in lost produce markets; $3.5 million in damaged produce; $1 million in postharvest treatment in 1989
Melon fly (*Dacus cucurbitae*)		1895		
Mediterranean fruitfly (*Ceratitis capitata*)		1907		
Oriental fruitfly (*D. dorsalis*)		1945		
Strawberry guava (*Psidium cattleianum*)	Brazil	1825	Cultivated for fruit	Forms a thicket shading out indigenous plants; fruit attracts pigs; crowds out cattle forage; serves as primary host to oriental fruit fly
Koster's curse (*Clidemia hirta*)	Tropical America	pre-1941	Possibly for erosion control	Highly invasive, forming a thicket in forest understory; 80,000 acres affected
Banana poka (*Passiflora mollissima*)	Andes	pre-1921	Ornamental	Heavy vines damage indigenous trees; alters forest understory; 100,000 acres affected
Fountain grass (*Pennisetum setaceum*)	Africa	early 1900s	Ornamental	Invades bare lava flows, natural areas, rangelands; provides fuel for damaging wildfires and is spread by fire
Fire tree (*Myrica faya*)	Azores, Canary Islands	pre-1900	Ornamental, or for fruit (wine) or firewood	Invades natural areas to form a dense stand, obliterating indigenous ground cover; upsets nitrogen balance in soils, encouraging other weeds; attracts pigs

SOURCE: Office of Technology Assessment, 1993.

at least seven other endangered species. The rosy snail (*Euglandina rosea*) from Florida was introduced in 1955 to prey on a non-indigenous pest, the African giant snail (*Achatina fulica*), but is widely believed to have also hunted many of the endemic snails to extinction (55).

Today organisms brought in for biological control are more rigorously screened to avoid nontarget effects; "no purposely introduced species, approved for release in the past 21 years, has been recorded to attack any native or other desirable species" in Hawaii (40). Other scientists, however, question whether monitoring adequately assesses other important impacts, such as competition with indigenous species (55). Still, most new problem species today are believed to be the result of accidental or smuggled introductions.

The rate of NIS establishment nevertheless remains high. About five new plant species per year have become established during the 20th century (133). For the 50-year period from 1937 to 1987, Hawaii received an average of 18 new insect and other arthropod species annually (6, 48)—more than a million times the natural rate and almost twice the number absorbed each year by North America (77). Since the mid-1940s, the annual rate for this fairly well-documented group has been highly variable (see also ch. 3)—ranging from at least 35 new species in 1945 and 1977 to 10 or fewer in 1957 and the beginning of the 1990s (86). It has been suggested that some of the upsurges may be related to wartime activities at the ends of World War II and the Vietnam War (6). Annually about three of Hawaii's new arthropod species turn out to be economic pests (7).

STATE OF INDIGENEOUS SPECIES

The impact of the high rate of biological invasions in Hawaii is partly reflected in the extreme numbers of its extinct and threatened or endangered indigenous species (table 8-1). Some of the best evidence of extinction by NIS comes from Hawaii, as in the case of the rosy snail (ch. 2). Although habitat destruction was probably the greater force behind extinctions in the past, today NIS, through predation and competition, are often considered to be the main threat because they can invade parks and other natural areas protected from development (128).

Hawaii has been described as the 50th State but first in terms of biological imperilment. It occupies only 0.2 percent of U.S. land area—the fourth smallest State—but takes up disproportionate space on the Federal Endangered Species List: about a third of the plants and birds listed or being considered for listing belong to Hawaii.

Much of the unique plant and animal life is already gone. Of all the plants and birds known to have gone extinct in the United States, two-thirds are from Hawaii (128).

Hawaii's spectacular bird life has been the most visibly diminished. Half of the original bird species, including all of the flightless birds, are known only from skeletal remains. Polynesians and their animals probably hunted the birds to extinction, or ensured their demise by clearing their habitat. About a dozen additional species are thought to have gone extinct since Cook's arrival. Most of the remaining birds are either threatened or endangered (table 8-1), accounting for the greatest known concentration of endangered birds in the world.

At least a tenth of Hawaii's plant species are already extinct, and about 30 percent of the remaining species are considered threatened or endangered (129); some botanists say as many as half may be at risk. The indigenous insects and other life forms are too poorly known to allow an assessment of their status, but experts believe they have been similarly affected (table 8-1). At least half of Hawaii's distinctive land snails, for example, are thought to be extinct, while the remaining species are probably all threatened or endangered, in large part because of the imported rosy snail (43,54).

Because islands are especially vulnerable to biological invasions, many of their indigenous species—Hawaii's in particular—were once thought to be doomed to extinction. But recent

work in ecological restoration in Hawaii has been promising, and some biologists and conservationists now express optimism that some habitats can recover when browsing animals, for example, are removed (55,70).

Causes and Consequences

Findings:

As a set of islands, Hawaii is unique among the 50 States in its vulnerability to the sometimes devastating ecological impacts of NIS. On the other hand its geographic isolation limits the pathways for introductions and presents unique opportunities for the design of prevention strategies.

Hawaii's natural areas and agriculture bear the brunt of new species' harmful impacts. However, agriculture, including horticulture and forestry, also has been a source of problem introductions.

Few economic or noneconomic activities in Hawaii are unaffected by or uninvolved in the influx of NIS to the State. Specific costs incurred because of harmful NIS, however, are available in only some cases. (The State does not maintain records of crop damages from pests.) Many of the consequences of invasions, especially in natural areas, are unquantified.

NATURAL AREAS

In Hawaii, harmful NIS have taken their greatest toll on natural areas. Although they produce no commodities like timber in substantial amounts, they are of value for their unique biological diversity, for maintaining the islands' freshwater supply, for providing scenery and some recreation in a tourist-dependent economy, and as a scientific laboratory.

Hawaii is considered an unparalled site for the study of evolution (see special issues of *BioScience*, April 1988; *Trends in Ecology and Evolution*, July 1987; *Natural History*, December 1982). The diverse indigenous species all evolved from a small number of colonizers (table 8-1) and

NATIONAL PARK SERVICE

Harmful non-indigenous species have taken their greatest toll on Hawaii's natural areas, including Haleakala National Park.

as such have been important for understanding how new species arise. One of the world's most dramatic examples of this process is Hawaii's 600 or more species of fruit flies, a quarter of the world's species, all the evolutionary descendants of one colonizing species. Similarly, a single colonizing finch species gave rise to 40 remarkably varied species of honeycreepers.

This evolutionary proliferation of species has endowed Hawaii with the most biological diversity per unit area in the United States (68); as such it is a potential source of useful new biological materials for research and development (123). Hawaii's endemic cotton plant (*Gossypium tomentosum*), for example, lacks the nectar-producing glands of other cotton species and has been used by plant breeders to create a commercial strain that is less attractive to insect pests. A marine coral produces a promising antitumor compound. Only a fraction of Hawaii's unique species, however, have been screened for such properties.

Many indigenous species—perhaps one-third or more of the insects, for example—have not even been described, prompting calls for a thorough inventory of the remaining species and important baseline population studies. The re-

cently signed Hawaii Tropical Forest Recovery Act[2] specifies development of "actions to encourage and accelerate the identification and classification of unidentified plant and animal species" (sec. 605) and baseline studies (sec. 607) in Hawaii forests. The legislation also authorizes grants for NIS control (sec. 610). The 1992 Hawaii legislature also took action[3] to establish a biological survey of the islands' indigenous and NIS.

Natural areas that still support indigenous species in relatively intact habitat make up about 25 percent of Hawaii (114). These areas are protected by the Federal Government (56 percent), the State (41 percent), and others, primarily the Nature Conservancy of Hawaii (3 percent).

The State forest reserves were established at the beginning of this century in recognition of the forests' importance as watersheds (27). Early management involved large-scale plantings of non-indigenous trees, as well as fencing and removal of feral goats, pigs, and other ungulates. By rooting, browsing, and trampling, these animals destroy the vegetation that holds soil in place, especially on steep terrains, resulting in run-off into rivers and streams. Communities have spent millions of dollars for water filtration systems to deal with the contamination, siltation, and discoloration (41).

Damage by feral ungulates is still one of two main non-indigenous threats to forests and other natural areas. Control of feral ungulates has been best achieved in parts of two national parks, but at considerable cost. Areas must be fenced off then cleared of animals by shooting. At Haleakala National Park (HALE), for example, 45 miles of fencing were installed around two important areas—including a rainforest of exceptional biological diversity—at a cost of $2.4 million, provided by the National Park Service's Natural Resource Preservation Program. Maintenance of fences—because of damage from storms, humidity, tree falls, and the like—costs an estimated $130,000 per year (67). Fencing is also under way at Hawaii Volcanoes National Park at a comparable cost.

Weeds constitute the second main non-indigenous threat to natural areas. About 90 of the estimated 900 established non-indigenous plant species in Hawaii are serious pests (109), capable of invading undisturbed natural areas. Hawaii's national parks have a much greater proportion of non-indigenous plant species than do other U.S. national parks (65). At Hawaii Volcanoes National Park, the non-indigenous plant problem is especially severe: 30 of the worst plant pest species are present, 24 of which are widespread (26). Out of 900 total plant species in the park, two-thirds are non-indigenous. Control by hand clearing, chemicals, or in some cases biological agents is concentrated on portions of the park that are especially sensitive; parkwide control is considered impossible.

Non-indigenous insects also threaten natural areas, by competing with or preying on indigenous species and altering pollination patterns, although the extent of their impact is less understood and has received less attention. Perhaps the worst of the insect pests are the predatory Argentine ant (*Iridomyrmex humilis*) and western yellow jacket (*Vespula pensylvanica*), which are the subject of monitoring and control research in the national parks.

For all natural areas, the control and management of harmful NIS consume the vast bulk of their resource management budgets. In the case of the two national parks, which have the most aggressive management programs, the 1987 resource management budget was $1.8 million (114); the 1991 budget was $1.2 million (86) prompting concerns among managers regarding shrinking and inconsistent funding. (Resource management represents 40 percent of the total park budget at HALE (66). By contrast, in the

[2] Hawaii Tropical Forest Recovery Act (1992), Public Law 102-574

[3] H.B. 3660

Table 8-3—Non-Indigenous Species in Hawaii: Roles of Federal and State Agencies

Federal Agencies

Treasury Department
- Customs Service—inspects cargo and passengers from foreign points of origin; directs cases to USDA or FWS

Interior Department
- Fish and Wildlife Service—manages 14 wildlife refuges, includes NIS control
  - Law Enforcement Division—inspects wildlife imported into United States to enforce CITES, ESA, and Lacey Act
- National Park Service—manages 2 nature parks, includes NIS control and research

Agriculture Department
- Agricultural Research Service—research on pest control and eradication
- Animal and Plant and Health Inspection Service
  - Animal Damage Control—works to reduce feral animal problems
  - Plant Protection and Quarantine—inspects foreign arrivals and domestic departures for U.S. mainland to prevent movement of agricultural pests
  - Veterinary Service—quarantines animals for rabies and other diseases

Forest Service—NIS control research

Defense Department
- Military Customs Inspection—inspects military transport arriving from foreign areas under Customs and APHIS authority

State Agencies

Governor's Office
- Agricultural Coordinating Committee

Department of Agriculture
- Board of Agriculture
  - Technical Advisory Committee—advises on plant and animal imports, based on input from five technical subcommittees
- Plant Industry Division
  - Plant Quarantine Branch—inspects arriving passengers and cargo to prevent entry of pests; reviews requests to import plants and animals; regulates movement of biological material among islands; provides clearance for export of plant material to meet quarantine standards
  - Plant Pest Control Branch—carries out eradication and control of plant pests through two sections: Biological Control and Chemical/Mechanical Control
- Animal Industry Division
  - Inspection and Quarantine Branch—inspects animals entering Hawaii, manages animal quarantines

Department of Land and Natural Resources
- Division of Forestry and Wildlife—manages State forests, natural area reserves, wildlife sanctuaries; involves watershed protection, natural resources protection, control/eradication of pest species.

SOURCE: Office of Technology Assessment, 1993.

National Park system as a whole, less than 10 percent of the budget is directed to natural resource management, a figure OTA finds to be low (ch. 6).) The budget for the State's Division of Forestry and Wildlife, which oversees State-owned forests, natural areas, public hunting areas, and wildlife sanctuaries (table 8-3), has been substantially increased in recent years. In 1991, it spent $2.8 million for pest control activities (86).

AGRICULTURE

Agriculture is Hawaii's third largest source of revenue—$551 million in 1991 (farmgate value)—behind tourism and military-related spending. Although declining in importance, sugar and pineapple remain Hawaii's two main agricultural products, respectively generating about $200 million and $100 million in recent years. "Diversified" agriculture—macadamia nuts, papayas, flowers, beef, dairy, coffee, and other products—

provides the rest and represents a growth industry for Hawaii.

All these products are derived from imported species, and virtually all the agricultural pests (primarily insects) are non-indigenous as well (8). (By contrast, estimates of non-indigenous agricultural pests on the U.S. mainland range from 40 to 90 percent of all pests.) Many pests arrived in Hawaii on agricultural material that was imported to improve genetic stocks or to introduce new crops. All of today's pineapple pests, for example, were brought in on vegetative material for propagation. The pests not only destroy crops but also limit markets in mainland and foreign areas that have imposed quarantines on produce from Hawaii because of the threat of new pests. This loss of export markets is often cited as the main barrier to the expansion of Hawaii's diversified crops, such as avocados (46).

The Governor's Agriculture Coordinating Committee spent $3.8 million from 1987 to 1990 on research to control or eliminate pest impacts on agricultural commodities (86). The Federal Animal Damage Control (ADC) unit (table 8-3) in Hawaii spent $181,000 (36 percent Federal funds) in 1989 to minimize feral animal damage to agriculture, as well as to natural resources, human health, and property (about half of ADC's work involves controlling bird strike hazards at airports). Agricultural and nonagricultural damage by non-indigenous animal pests confirmed by or reported to ADC in 1989 amounted to $6.9 million (126).

Specific pest-control or -damage costs borne by various types of agriculture follow. Instances where agriculture has contributed to Hawaii's NIS problem are also noted. In general, about half of Hawaii's non-indigenous established plants are thought to have been introduced as crops or ornamentals (133).

Crops—Costs of pest control and damage are best documented for sugar cane, Hawaii's main crop. Throughout its 150-year history, the sugar cane industry has been confronted with a series of damaging insect pests, most of which were eventually controlled biologically. In 1904, the sugar cane leafhopper (*Perkinsiella saccharicida*) from Australia was responsible for the loss of 70,000 tons of sugar, at a cost of $25 million in 1990 prices ($350 per ton), according to the Hawaiian Sugar Planters' Association (91). By 1907, the leafhopper was subdued by several predators imported from Australia.

The sugar cane beetle borer (*Rhabdoscelus obscurus*) from New Guinea was first found in 1865 and remains an important pest of sugar cane. Damage from the insect is exacerbated in areas where rats are a problem, since damaged stalks are favorable for egg laying. A study of losses at two plantations in the 1960s estimated that borers destroyed 2.2 percent of the crop. Industry-wide losses from this pest amount to about 3,000 tons of sugar per year, or about $1 million annually (1990 prices).

Since 1985, at least four new insect pests of sugar cane have become established in the State (90). The lesser cornstalk borer (*Elasmopalpus lignosellus*) has exacted an estimated $9 million in lost yields and other costs since it appeared in 1986 (124). A parasitoid from Bolivia was established in 1991 and is now suppressing the borer in sugar cane fields.

Chemical controls are used on weeds, which are even more costly to the sugar cane industry than are insect pests (91). (Chemical pesticide manufacturers have generally not addressed the needs of Hawaii's agriculture, however, because of its small size and the expense involved in obtaining clearance for new pesticides by the Environmental Protection Agency.) Research costs for all types of pest control in the sugar cane industry in recent years have approached $1 million annually (table 8-4). Development of sugar cane resistance to recently introduced diseases, primarily sugarcane smut and rusts, accounts for another large portion of the industry's research (an estimated $400,000 in 1991 and 1992).

Table 8-4—Research Costs for Sugar Cane Pest Control in Hawaii, 1986-1992

Pest	1986-87	1988-89	1991-92
Weeds	$ 60,000	$214,000	$260,000
Rats	$104,400	$281,000[a]	$232,500[a]
Insects	$101,000	$224,600	$179,000
Diseases	$152,700	$208,000	$172,000
Total	$418,100	$927,600	$563,500

[a] Includes $220,000 from USDA.

SOURCE: Sugar Industry Analyses, 1986, 1988, 1991.

Quarantines imposed on Hawaii's fresh produce because of established pest species have been a substantial cost to growers by limiting markets. The most serious market-limiting pests are the Mediterranean fruit fly (*Ceratitis capitata*), the melon fly (*Dacus cucurbitae*), and the Oriental fruit fly (*Dacus dorsalis*), known as the trifly complex (box 8-A). The financial impact of such quarantines are difficult to gauge; it has been conservatively estimated that Hawaii's export market could increase by 30 percent if quarantines on tropical fruits were lifted (46).

Ranching—Hawaii's pastures and rangelands are vulnerable to invasions by non-indigenous plants, such as the ornamental fountain grass (*Pennisetum setaceum*), which are unpalatable and lower livestock (primarily cattle) productivity. Grasses planted on rangelands themselves are imported and have been plagued by such pests as the armyworm (*Pseudaletia unipuncta*) and grass webworm (*Herpetogramma licarsisalis*). Since its discovery in Kona in 1988, the highly invasive yellow sugarcane aphid (*Sipha flava*) has spread to all the islands and exacted several million dollars in losses annually from State ranchers and $200,000 in biological control research (124).

Seeds, grasses, and animal feed imported by ranchers are believed to have been the avenue for the introduction of some weeds, as in the case of broomsedge (*Andropogon virginicus*) (27), an invasive North American grass that is adapted to fire. Many sugar cane weeds are believed to have arrived in imported rangeland materials (91). Kikuyu grass (*Pennisetum clandestinum*), a rangeland cover imported from Africa, has itself become a weed in natural areas (109). Finally, browsing cattle have been a destructive force in natural forests and other habitats (27).

Ornamentals—The ornamental plant and floral industry in Hawaii has grown in recent years, although it too has been limited by quarantines on specific fresh products. Based predominantly on NIS, the industry has also been affected by new diseases and pests. A bacterial blight was responsible for a drop in revenues from anthuriums (*Anthurium* spp.), a shiny, brilliantly colored flower from Central America, and a lucrative commodity for the State ($8 million in 1988, the sixth largest crop). A sample of some 50 farms lost $5.5 million in 1987 revenue and $1.6 million in 1989 revenue because of the disease (124).

Two non-indigenous birds, the red-vented bulbul (*Pycnonotus jocosus*) and the red-whiskered bulbul (*P. cafer*), are responsible for significant damage to orchids, a leading product in the cut flower industry, as well as to fruits and other horticultural products. In 1989 the total cost of damaged orchids on Oahu, the only island to be invaded thus far, was $300,000 (46). Indigenous to India and prohibited from entry by State law, bulbuls probably were smuggled into Hawaii as pets, which then escaped or were released in the mid-1960s.

In turn, horticultural activities have been responsible for much of Hawaii's non-indigenous plant problem. Several hundred non-indigenous plants introduced for landscaping or cultivation have escaped and become established (138).

One of Hawaii's worst weeds, the banana poka, a pink-flowered vine, was introduced as an ornamental early in this century and today infests about 100,000 acres of forest. It is notorious for engulfing indigenous trees, killing them or breaking branches and altering the understory. About $1 million in State and Federal funds was spent between 1981 and 1991 on research for the biocontrol of banana poka and Koster's curse

Box 8-A—Costs of Hawaii's Major Fruit Fly Pests and Their Eradication

Three of Hawaii's insect pests—the Mediterranean fruit fly (medfly) (*Ceratitis capitata*), the Oriental fruit fly (*Dacus dorsalis*), and the melon fly (*Dacus cucurbitae*)—were responsible for $300 million in lost markets in 1989, according to the Hawaii Agricultural Alliance. In addition, the so-called trifly complex cost $3.5 million in damaged produce and $1 million in fumigation or other postharvest treatments. The trifly complex has "imposed strong constraints on the development and diversification of agriculture in Hawaii and has provided a large reservoir for the unwanted and increasingly frequent introduction of fruit flies into the mainland United States and other areas of the world via contraband fruit," according to the Agricultural Research Service. Consequently, ARS is conducting a series of technology demonstration tests to help determine the feasibility of statewide eradication of the fruit fly pests.

The three flies became established in Hawaii beginning with the melon fly in 1895, the medfly in 1907, and the oriental fruit fly in 1945. Their establishment was aided by the spread in Hawaii of non-indigenous plants that serve as host plants for the pests. The medfly alone—considered one of the world's worst agricultural pests—infests 250 fruit and vegetable crops. A 1980-1982 effort to eliminate the medfly from seven California counties cost $100 million, according to the U.S. Department of Agriculture (USDA).

California agricultural interests have been strong proponents, if not the strongest, of the proposed eradication project in Hawaii, as well as of the inspection of first-class mail from Hawaii, since the islands are assumed to be a major source of medfly arrivals in California. But preliminary DNA analysis of medflies trapped in California during its 1989 and 1991 infestations indicates the flies very likely did not come from Hawaii; genetically they resemble medflies from Argentina and Guatemala. While the finding does not rule out the possibility that Hawaii may be a source of medfly introductions in the future, it also raises the possibility that Hawaii's role in medfly introductions to the mainland may be overemphasized. Additional genetic studies should help clarify where new infestations are coming from and hence where resources should be targeted.

In the meantime, Hawaii's first demonstration project, slated to end in 1993 at a 3-year cost of $5 million, is attempting to eradicate a large established medfly population on the island of Kauai through the release of sterile insects, although no eradication has been achieved with this technique alone; traps with lures and the insecticide malathion are expected to have to be used against the more abundant oriental fruit fly and melon fly. Demonstration projects for eradication of these fruit fly species are scheduled to run into the next century, at which point the decision is expected to be made on whether to proceed with statewide eradication.

Statewide eradication plans have been controversial because of concerns for public health, as well as for the diverse endemic fruit fly populations in Hawaii, given the likely use of insecticide. Objections have also been raised over the enormous cost of such an undertaking—perhaps $200 million or more for medfly eradication alone—and, if it succeeds, the strong possibility that the pests could become reestablished unless Hawaii's and USDA's inspection and quarantine efforts are substantially improved. The Malaysian fruit fly (*Bactrocera latifrons*), which is also targeted in the eradication plans, was introduced as recently as 1983.

SOURCES: J.R. Carey, "The Mediterranean Fruit Fly in California. Taking Stock," *California Agriculture*, Jan.-Feb. 1992, pp. 12-17; W.S. Sheppard, G.J. Steck, and B.A. McPheron, "Geographic Populations of the Medfly May Be Differentiated by Mitochondrial DNA Variation," *Experientia*, vol. 48, No. 10, October 1992, pp. 1010-1013; U.S. Department of Agriculture, Agricultural Research Service, Tropical Fruit and Vegetable Research Laboratory, "I. ARS Perspective for Fruit Fly Eradication in Hawaii and Pilot Test Requirements for Demonstration of Technology," and "II. Pilot Test to Eliminate Mediterranean Fruit Fly from the Islands of Kauai and Niihau: Detailed Work Plan," drafts (Honolulu, HI: December 1989); R.I. Vargas, research scientist, ARS, personal communications, Dec. 18, 1991, Feb. 10, 1992.

(*Clidemia hirta*), another forest weed (46) (table 8-2); additional sums are spent by public and private groups in pulling weeds or applying herbicide. A 2-year poka eradication effort on Maui was allotted $244,000 by the State (56).

Other ornamentals that have escaped to become problems in natural areas are the fire tree (*Myrica fava*), fountain grass (table 8-2), and other grasses. In some cases, botanic gardens have been the source of the escapees (109). For

example, the velvet tree (*Miconia calvescens*), an incipient invader described as the botanical equivalent of rabbits, probably escaped from a private botanic garden.

TOURISM

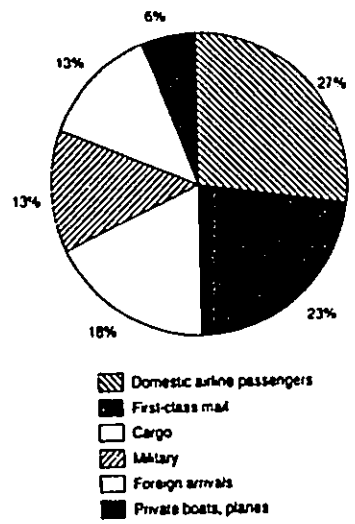
The large volume of traffic associated with tourism is often cited as a factor behind the influx of harmful NIS to the islands. At the same time, the $9.9 billion visitor industry (in 1991) is the State's biggest source of revenue and largest employer. Consequently, some observers believe there has been resistance in Hawaii to implementing controls that may be perceived as deterring visitors.

The number of visitors in 1990 was 6.9 million, according to the Hawaii Visitors Bureau, an increase of about 50 percent from 1980. Most of the visitors are from the U.S. mainland and Canada, especially the West Coast, with an increasing number from Japan. The remainder come from other countries in Asia and western Europe (78).

According to an opinion survey of State agriculture inspectors, airline passengers are thought to be the most common pathway for insect pests and illegal animals to be introduced, on undeclared plants hidden in carry-on or checked baggage (49) (figure 8-1). For domestic arrivals, this pathway may become less important if a 1992 State law is well enforced. Previously, the State's agricultural declaration process was easily bypassed; the law now requires all passengers to fill out a declaration form, with increased penalties for bringing in prohibited organisms.

Development catering to the large number of visitors may also contribute to the NIS problem by disturbing natural habitats, providing inroads for invasive species. Unauthorized importations of grass materials for golf courses are thought to be the inadvertent avenue for the recent increase in the number of introductions of sugar cane (also a grass) and rangeland pests (91,124). The yellow sugarcane aphid, for example, was first found in 1988 near a new golf course development.

Figure 8-1—Perceived Importance of Pathways in the Introduction of Insect Pests and Illegal Animals in Hawaii



SOURCE: Based on an opinion survey of State agriculture inspectors in the Department of Agriculture, State of Hawaii, Honolulu, "Report to the 15th Legislature, 1988 Regular Session."

Many observers point out that Hawaii's tourism depends on the unique natural beauty of the islands and that it would be harmed if the indigenous natural resources are further diminished by harmful NIS (12,78). But there is also said to be little emphasis within the visitor industry on ecotourism or the distinctiveness of Hawaii's indigenous plant and animal life (109,113). Resorts and residences are typically landscaped with tropical plants from around the world: bougainvillea (*Bougainvillea buttiana*) (from Central America); bird-of-paradise flower (*Strelitzia reginae*) (from Africa); palms from other tropical areas. Even the traditional Hawaiian lei is usually made with non-indigenous plants.

MILITARY

Defense spending accounts for about $2 billion, or 10 percent, of State revenues, the second largest share. The military is also believed to be a significant contributor of new introductions to the State and among the islands (figure 8-1) because of the large volume of traffic associated with it. Military personnel traveling from Fiji may have been responsible for the introduction of bulbuls, for example (135).

Military transport in recent years is thought to have been responsible for bringing in from Guam one of the most serious non-indigenous pest threats to Hawaii, the brown tree snake (*Boiga irregularis*). Although the snakes were dead or seized, the possibility of their introduction remains a serious concern (box 8-B), especially with the relocation of military personnel from closed bases in the Philippines to Singapore and Guam. Traffic between Guam and Hawaii is projected to increase accordingly (11).

OTHER SECTORS

Two additional groups are often highlighted for their impact on the NIS problem in Hawaii: sport hunters and pet keepers.

Sport hunting—All of the legally hunted game birds and mammals in Hawaii are introduced, and the maintenance of these populations—including feral ungulates—has often conflicted with conservation of natural areas. Negative impacts on natural areas have been documented for many of the game species (27). The kalij pheasant (*Lophura leucomelana*), for example, feeds on and disperses the seeds of the invasive banana poka, enhancing its spread. Game and other non-indigenous birds are also the source of introduced diseases afflicting indigenous birds (131). On the other hand, sport hunting provides the State with one means of reducing feral ungulates and generates almost $100,000 annually from the sale of licenses (51).

The conflict may have peaked in 1988, when a Federal court found that the State Department of Land and Natural Resources had "demonstrated susceptibility" to hunters by not protecting the habitat of one of Hawaii's endangered birds, the palila (*Loxioides bailleui*), from destruction by feral goats and sheep (120). Under the ruling, the State was required to remove the animals from the palila's habitat (see ch. 7). More recently, the State has begun to address the issue of feral ungulate removal from other, especially sensitive natural areas (86).

Pet trade—Animals escaped from their cages or dumped by their owners are a common source of vertebrate introductions today, particularly of birds and reptiles (80). Several species of aquarium fish have also found their way into Hawaii's streams (71). According to the Hawaii Department of Agriculture, about 22,000 birds from U.S. and foreign sources were imported in 1989, primarily for pet stores. They also sell thousands of rabbits (*Oryctolagus cuniculus*) each year.

In October 1989, a resident released six unwanted rabbits at Haleakala National Park. Feral rabbits can severely damage indigenous plants and birds (by attracting predators), and the rabbits' eradication became the park's top priority once the population was discovered. By May 1991, 100 rabbits had been snared, shot, or trapped. The emergency eradication cost $15,000 (National Park money) (66). Although the rabbits were considered eradicated in 1992, future releases of escaped pets are expected to be a recurring problem, with no Federal, State, or island agency mandated to prevent rabbits from establishing (67).

Searching for Solutions

Finding:

Hawaii's geographic isolation makes it the state most in need of a comprehensive policy to address NIS—virtually a separate "national" policy with its own programs and resources. The greatest challenge is to coordinate this need with Federal priorities, which can differ. For example, Federal port inspections and

Box 8-B—The Potential Invasion and Impact of the Brown Tree Snake in Hawaii

The brown tree snake has been singled out as one of the more serious—and perhaps imminent—new biological invasions facing Hawaii. It also illustrates how approaches to such threats are often cobbled together, with unclear lines of authority or responsibility among agencies.

Indigenous to the Solomon Islands, Papua New Guinea, and northern Australia, the snake (*Boiga irregularis*) has been accidentally dispersed—usually as a stowaway on planes and ships—to several Pacific Islands, including Hawaii. So far, however, the snake is only known to be established on Guam, where the social cost has been great and the ecological impact disastrous.

As on most Pacific Islands, the indigenous birds of Guam evolved in a snake-free habitat (the island has only one small, blind, wormlike snake species) and consequently lack the protective behaviors of other birds. They were easy prey for the bird- and egg-eating brown tree snake when it arrived sometime around 1950. Of 11 species of indigenous forest birds present in 1945—some of which were unique to the island—9 have gone extinct on Guam. The remaining species have been drastically reduced. Experts attribute the extinctions and declines to the brown tree snake.

Along with birds, the snake also feeds on introduced rats and shrews, whose numbers have also declined. Today the snake is sustained primarily by introduced lizards. The large number of introduced species and other ecological disturbances on Guam have facilitated the snake's invasion of the island. With a diverse and vulnerable prey base and no natural predators, the snake population has soared, reaching densities of 16,000 to 30,000 per square mile.

An able climber, the brown tree snake damages power lines, frequently interrupting service and costing Guam millions of dollars a year. Although it is not considered dangerous to human adults, it is mildly venomous and can poison small children. During a 14-month period in Guam, 27 people were treated for snake bites at one hospital emergency room. The 8-foot-long adult snake commonly enters homes through sewer lines, air conditioning vents, and other openings.

Several characteristics of the brown tree snake make it a likely candidate for invading other islands from Guam. "It is tolerant of disturbed habitats and can maintain dense populations near shipping ports. It is nocturnal [hiding during the day] and readily escapes detection in or around cargo. It is able to live for long periods of time without food, and is thus able to survive for long periods in ships' holds or cargo bays of aircraft. Finally, the broad range of feeding habits ensures that snakes arriving in new environments will adapt to available lizard, bird, and mammal prey species and will therefore be likely to successfully colonize [a new] island." (32) Several reports in 1992 of snake sightings on Saipan in the Marianas, a U.S. Trust Territory, have raised suspicions that the brown tree snake may be colonizing that island.

The increased threat to Hawaii—where the climate is hospitable, habitats have been extensively disturbed, and many indigenous and introduced species exist as a potential prey base—is seen to be the result of the high snake densities on Guam and the frequent number of military and civilian flights from the island. The brown tree snake has turned up in Hawaii at least six times between 1981 and 1991, at Honolulu International Airport, Barbers Point Naval Air Station, and Hickam Air Force Base. Two snakes were found on the same day in September 1991: one crushed on an airport runway, the other live, coiled underneath a military transport that had arrived 12 hours earlier.

Pest problems are best contained by interceptions at the points of departure, and inspection of military flights departing Guam for Hawaii (typically five per week) is said to have been tightened as awareness of the threat has increased. Jurisdictional questions remain, however, about inspection of the 10 to 15 civilian flights per week—whether it is a Federal, Territorial, or State (Hawaii) responsibility. Such questions have resulted in a generally uncoordinated response to the problem.

(continued on next page)

Box 8-B—The Potential Invasion and Impact of the Brown Tree Snake in Hawaii—Continued

The main vehicle for the Federal Government's response has been a line item in the budget for the Office of Territorial and International Affairs in the Department of the Interior. Beginning in 1990, the office has received $500,000 to $600,000 annually for brown tree snake research and control, with $100,000 to $200,000 earmarked for the Hawaii Department of Agriculture, to explore the use of dogs in detecting snakes. The remainder has been disbursed to Guam; a Fish and Wildlife Service research program; and, beginning in fiscal year 1992, the Animal Damage Control unit of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service. Also beginning in 1992, the Department of Defense (DOD) was appropriated $1 million in new money for brown tree snake research and control, in addition to funds available for the brown tree snake through its Legacy program (which provides for natural resources management on DOD lands).

In addition to these appropriations, Congress has addressed the brown tree snake in several pieces of legislation. The Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPACA) of 1990,[1] which focuses on the zebra mussel, directs that a program be developed to control the snake in Guam and other areas. Two other bills direct that the Secretary of Defense[2] and the Secretary of Agriculture[3] take steps to prevent the introduction of the brown tree snake into Hawaii. In Hawaii, in addition to the federally funded airport dog teams for snake detection, State-run SWAT teams have been established on each of the islands to respond in the event of snake sightings.

Despite these actions—as well as a memorandum of agreement intended to coordinate the various State, Territorial, and Federal departments involved—the overall Federal response to the brown tree snake is perceived in Hawaii to have been uneven and sometimes slow. A committee to carry out the NANPACA-directed activities was not in place until 1993, and no agency has taken on the crucial task of inspecting civilian aircraft in Guam before departure.

Ultimately, safeguarding Hawaii and the Pacific basin will depend on establishment of long-term control on Guam. Research by the Fish and Wildlife Service is aimed at an ecological control, along with more immediate controls such as the use of methyl bromide for fumigating cargo and the use of toxicants, baits, and traps. Costs for the various controls that would need development have been estimated to be about $2.5 million annually over several years.

[1] P.L. 101-646, sec. 1209.

[2] Department of Defense authorization, P.L. 102.190, sec. 348.

[3] Farm Bill Technical Corrections, P.L. 102.237, sec. 1012.

SOURCES: T.H. Fritts, U.S. Fish and Wildlife Service, *The Brown Tree Snake: A Harmful Pest Species* (Washington, DC: U.S. Government Printing Office, 1990); J. Engbring and T.H. Fritts, "Demise of an Insular Avifauna: The Brown Tree Snake on Guam," *Transactions of the Western Section of the Wildlife Society*, vol. 24, 1988, pp. 31-37; T.H. Fritts, personal communications to the Office of Technology Assessment, Jan. 10, Jan. 30, and December 1992; G.R. Leong and P. McGarey, legislative assistants to Sen. D.K. Akaka, personal communications to Office of Technology Assessment, Jan. 8, 1992, and Dec. 3, 1992, respectively; P. Delongchamps, Office of Territorial and International Affairs, personal communications to Office of Technology Assessment, May 22 and December 1992; L. Nakahara, Plant Quarantine Manager, Hawaii Department of Agriculture, personal communication to Office of Technology Assessment, Apr. 18, 1992 and June 23, 1993.

quarantines are directed at protecting mainland agriculture and enforcing international trade agreements, sometimes at the expense of Hawaii's natural resources and agriculture.

FEDERAL INVOLVEMENT

Hawaii's experience with NIS is also distinctive in terms of Federal involvement. Hawaii is the only State where all passengers and cargo enroute to other States (to the U.S. mainland) are subject to "preclearance activity" by Federal agricultural inspectors, a function of Hawaii's geographic isolation and a Federal quarantine imposed before Hawaiian statehood. Agricultural inspection of traffic from the mainland to Hawaii, however, is for the most part left to the State; the

nature of mainland pest problems do not meet the existing criteria to warrant Federal inspection of Hawaii-bound passengers and goods.

The domestic quarantine on Hawaii has in turn led to Federal inspection of first-class mail leaving Hawaii and a recent proposal (which failed) to collect inspection fees from passengers departing the State for the mainland. The Federal intent of all these actions, along with the proposed fruit fly eradication program (box 8-A), has been protection of mainland agriculture. An unintended effect, however, has been creation of a double standard, since reciprocal protective measures have not been applied to Hawaii. In 1992, Congress took action to begin to redress this imbalance; any changes in the system have yet to be evaluated.

Details about the Hawaii quarantine, inspection fee, and first-class mail issues follow.

Hawaii quarantine—Passage of the Plant Quarantine Act[4] led to the quarantine of Hawaii to prevent importation of the Mediterranean fruit fly and other agricultural pests.[5] The U.S. Department of Agriculture (USDA) began inspecting goods bound for the U.S. mainland in 1910 and goods arriving in the islands from foreign ports in 1949. Hawaii's own plant and animal quarantines were begun before the turn of the century.

The Federal quarantine regulations stipulate that cargo and passengers from Hawaii to the U.S. mainland are to be inspected by USDA's Animal and Plant Health Inspection Service (APHIS) for prohibited materials (fresh produce, cut flowers, and other plant materials). Certain products are allowed provided they are treated or handled according to prescribed methods to kill any pests.

This preclearance activity, aimed at preventing pests from reaching the mainland, accounts for about 85 percent of APHIS's Plant Pest Quarantine activity in Hawaii (106). Inspection of ships and planes arriving from foreign countries accounts for 15 percent. The division of resources is said to be roughly proportional to the number of domestic and foreign passengers.

APHIS inspection of foreign arrivals focuses on federally prohibited agricultural pest species, which in turn reflects the temperate climate that predominates in the United States (110). This policy may allow new pests into Hawaii that could otherwise be avoided. For example, State officials tried unsuccessfully to have a mealybug pest (*Pseudococcus elisae*) of bananas declared a federally prohibited species after it repeatedly turned up in the mid-1980s on bananas from Central America that were shipped from the U.S. mainland, where they are inspected by APHIS. The mealybug eventually slipped into Hawaii, became established, and has resulted in lost markets: California rejected shipments of cut flowers from Hawaii because of mealybug infestation (124).

Since the State has no authority over foreign traffic, State agricultural inspectors rely on Federal inspectors (table 8-3) for referrals in order to intercept State-prohibited species. Cooperation among the agencies in this regard is generally said to be good, although neither State nor Federal inspection staffing has kept pace with the growth in traffic through Hawaii in recent years. Between 1971 and 1988, for example, State inspection activities on Oahu increased by a total of 138 to 1000 percent, while staffing increased by 15 percent (49). In the last 5 years, APHIS has received less than its requested budget, and staffing has remained constant, although the 1992 budget allowed for an increase (52).

Over the past decade, Customs has undergone a change in policy, from one of inspection of all foreign arrivals to "profiling"—inspection of only a fraction of arrivals—in order to facilitate the movement of passengers. In Honolulu, which is said to be one of the stricter ports of entry into the United States, APHIS and Customs each

[4] Plant Quarantine Act of 1912, as amended (7 U.S.C.A. 161)

[5] 7 CFR Ch. III part 318 (Jan. 1, 1991).

manage to check about 15 percent of the international baggage passing through the airport. (A goal is to check all of the baggage originating from high-risk areas such as the Philippines.) In contrast, APHIS inspects all of the baggage bound for the mainland by x ray. Many observers maintain that goods and people coming into Hawaii should be as thoroughly inspected as is mainland-bound baggage to minimize the flow of unwanted new species into the State and, in turn, the rest of the country.

Pests found on the U.S. mainland may be as threatening to Hawaii as those brought in from foreign points of origin: seven of the eight new insect pests of grasses that have appeared in Hawaii in the last decade occur in the continental United States, including the economically important yellow sugarcane aphid and the lesser cornstalk borer (124). The transit of goods and people from Florida and the Caribbean through the mainland to Hawaii is thought to be an increasingly common pathway of harmful new pests (7).

Domestic quarantine user fees—In 1991, APHIS proposed to collect user fees from inspected passengers and vessels departing Hawaii for the mainland. The user fee, of $2 per passenger, was intended to cover the cost of agricultural inspections,[6] in order to meet deficit reduction goals. The fee would have been similar to the fees collected by U.S. Customs and Immigration and Naturalization services.

But the fee was interpreted as a "tourist tax" that discriminated against Hawaii, being the only State subject to domestic agricultural quarantine and inspection activities. After the rule had been made final,[7] the Hawaii congressional delegation took the unusual step of inserting a provision in the 1992 Federal budget that prohibits such domestic inspection user fees (45). Again, the proposed action was seen as benefiting the

Inspections of foreign arrivals are intended to intercept harmful non-indigenous species, while educational materials are often aimed at decreasing the number that reach inspection stations.

[6] 56 *Federal Register* 8148 (Feb. 27, 1991).

[7] 58 *Federal Register* 18496 (Apr. 23, 1991).

mainland at the expense of Hawaii's tourists and residents.

First-class mail.—First-class mail and express mail delivery services have been identified as an important pathway for the introduction of new pests to Hawaii (figure 8-1). Plant material mailed into the State is possibly responsible for the introduction of the large number of whiteflies established in the last 25 years, since these pests can only be transported long distances on living plants (7). Similarly, prohibited seeds, plants, fruits, other insects, and small animals have all made their way into Hawaii through the mail.

Prohibited materials have been intercepted only when suspicious packages were noticed and the State informed, since domestic first-class mail is federally protected from inspection. (Foreign mail may be inspected.) Congress, however, following passage of the Agricultural Quarantine Enforcement Act,[8] which prohibits mailing of quarantined agricultural material, authorized a trial first-class mail inspection program in Hawaii, but only of pieces departing for the mainland. The intent was to determine if fruit flies were arriving on the mainland through domestic first-class mail.

The trial program, originally proposed to run for 60 days at a cost of $30,000 in USDA funds, involved use of an APHIS dog at the main Honolulu post office to sniff parcels for any biological material. Reportable fruit flies, the target of the program, and other insect pests were found on produce seized from 130 parcels (94), most of which were bound for California, Oregon, or Washington. According to another report on the program, fruit flies were found in 29 of the 2 million packages processed between June and October 1990; five contained the Mediterranean fruit fly. The report concluded that first-class domestic mail from Hawaii is a means of transport for the medfly larvae, "but that the rates are low" (16).

The trial program has been indefinitely extended, entailing three additional staff positions (107), at an estimated cost of $100,000 annually. The use of Federal funds to conduct the one-way inspection was again perceived as discriminatory in Hawaii, given the importance of first-class mail as a pathway for introduction to the islands (93). Consequently, legislation readdressing the issue for Hawaii was introduced and signed in 1992. The Alien Species Prevention and Enforcement Act[9] is intended to prevent the introduction of new pests to Hawaii through first-class mail by allowing inspection of incoming parcels as well.

With each of these issues, the historical lack of reciprocal protection for Hawaii's agriculture and especially for the large number of federally listed endangered species has created the perception of a Federal bias, with the $17 billion California agriculture industry seen as the primary beneficiary. It is frequently observed as well that the growing national interest in conserving tropical forests in the developing world should be extended to U.S. tropical forests—namely, those in Hawaii (2,85).

A greater Federal role in protecting Hawaii from new damaging introductions may also be warranted because of the large military presence in the State. All military arrivals from foreign ports, as well as military departures for the mainland, are inspected in Hawaii under the authority of Customs and APHIS. Military customs inspectors collaborate with APHIS on foreign arrivals and routinely spray plane cabins with insecticide. Military arrivals from the mainland, however, are a State responsibility, and inspections are said to be limited (49).

On the other hand, the Federal Government—namely the National Park Service—has been considered the most effective manager in terms of

[8] Agricultural Quarantine Enforcement Act of 1988, Public Law 100-574.

[9] Alien Species Prevention and Enforcement Act of 1992, Public Law 102-393, Part 3015.

preserving Hawaii's habitats through the control of harmful NIS (112,114).

Finding:

The National Park Service devotes considerable resources to eradicating or controlling harmful NIS in Hawaii within and outside park boundaries. The impact of these efforts are limited, however, because State management on its own lands has been less aggressive. Influx of a significant number of new species annually, despite Hawaii's relatively strict system of regulating introductions, compounds the problem.

STATE ROLE

State laws governing the entry of new plant and animal species specify protection of agriculture, the natural environment, and public health. Natural resources, however, are said to rank behind agriculture and other economic issues, especially tourism, as a priority for the State (61,108). Comparison with other States' spending levels bears out this observation.

Hawaii's Division of Forestry and Wildlife in the Department of Land and Natural Resource, which oversees the State-owned natural areas (table 8-3), ranks 8th out of 50 States in terms of the area it is responsible for (900,000 acres), but 38th in permanent staff and 45th in funding (13). Similarly, Hawaii ranks 44th in terms of its annual expenditures on natural resources and the environment (0.85 percent of the State budget), although this ranking may reflect the State's small size and relative lack of "brown" environmental problems associated with heavily industrialized States. In per capita spending, it ranks 29th ($25.35) (10).

Hawaii spends almost $1.9 million annually on its agricultural quarantine program, 90 percent of which involves inspection of incoming passengers and goods and other preventive measures (50,124). But coverage of incoming traffic to the islands is still incomplete. A 1989 assessment by the Hawaii Department of Agriculture estimated that the additional cost of extra staffing and 16 x-ray units (for 16 baggage claims) to ensure complete inspection of incoming domestic baggage alone would be about $2.25 million (49). In contrast to Federal inspection of mainland-bound baggage, which is all x rayed, State inspectors have relied on agriculture declaration forms to bring to light any incoming produce, plants, or animals.

Opinion differs on the efficacy of the State's importation and quarantine system. In one high-profile example, the importation of Christmas trees each year, the likelihood of harmful new insect introductions has taken a backseat to a traditional societal demand. Because there is no effective fumigant that does not damage the trees, they are only visually inspected. Christmas trees were very likely the vehicle on which yellow jackets arrived in Hawaii, as might gypsy moths (*Lymantria dispar*), according to some observers.

Other prevention efforts are improving. In 1990, State inspectors began to use beagles to sniff baggage and cargo arriving from the mainland. Use of one portable x-ray unit for random inspection of domestic baggage was also instituted. Penalties for smuggling in prohibited species have been substantially increased, and the State list of prohibited plant species is being updated for the first time in 10 years. To emphasize protection of natural areas, the Department of Land and Natural Resources, with the support of environmental groups, is exploring the possibility of creating a separate list of State-prohibited plant species that threaten natural areas.

Many observers point out that the most cost-effective approach to dealing with new pests anywhere is to prevent their introduction (86). Hawaii clearly needs tightened inspection and quarantines to minimize the number of harmful new introductions. Neither State nor Federal efforts have been up to the task.

Harmful new introductions are expected to be reduced once the recently authorized program for inspection of first-class mail from the mainland to Hawaii is in place. New pests could be further reduced by inspection of:

ANIMAL AND PLANT HEALTH INSPECTION SERVICE

In 1990, State inspectors began using beagles to sniff baggage and cargo for prohibited soil, agricultural products, and other biological materials.

- all arriving domestic airline passengers and baggage. Complete inspection by x ray or beagles would require reconfiguration of Honolulu's airport, or that agricultural monitoring be made along with security checks at the main U.S. points of departure for Hawaii. Federal involvement in domestic arrival inspections would require a change in APHIS's mandate; complete inspection by the State would require a redoubling of current efforts and a clarified legal mandate.
- military transport arriving from the mainland, requiring increased State effort and/or military effort or a change in APHIS's mandate.
- all arriving international airline passengers and baggage. Complete inspection by x ray or beagles would require increased APHIS staffing and airport reconfiguration.

A more controversial option, because of objections by the public to pesticides, would involve treating planes arriving from the Pacific region with insecticide, since visual inspection of a plane is not fail-safe. Such treatment was once routine for mosquito (malaria) control.

Shortcomings exist in the State's efforts to control and eradicate NIS. Responsibility is divided, depending on the type of species (insect, plant, or other animal); whether it has an economic impact; and where the infestation is occurring. Response to emergencies is said to be slow for this reason. The jurisdictional difficulties of controlling pest species on private land is a particular problem (86).

Monitoring to detect pests before they become too widespread to eradicate is also incomplete. The Hawaii Department of Agriculture maintains a program using traps, sweepings, and surveys to detect new insect pests, but there is no clear authority for monitoring in cases like feral rabbits.

EDUCATION

Finding:

Public education is considered central to solving problems involving NIS in Hawaii. These efforts are better developed in Hawaii than elsewhere in the United States.

Education is repeatedly cited as the primary tool for enlisting the public's cooperation in containing the problem of harmful NIS. The state of public understanding about the issue in Hawaii is probably no different than anywhere else, but the ecological repercussions of a lack of public understanding are more severe, as in the case of the released rabbits in Haleakala National Park.

The rabbit case also indicates how effective public education can be. Park-generated publicity and media attention resulted in calls from the public about rabbit sightings. The pet owner

responsible for the release was unaware of the rabbits' impact and was said to be apologetic. The incident led to a proposal to create a National Park Service public outreach position devoted to such issues. The idea was praised, although it did not receive funding.

Other public and private groups in Hawaii have begun educational campaigns related to NIS, including the Alien Species Alert Program (ASAP) of the Hawaii State office of the National Audubon Society; publicity about prohibitions of mailing fruits and vegetables to the mainland by the USDA and the U.S. Postal Service; informational outreach about indigenous species by the Division of Forestry and Wildlife; and the Bishop Museum's Ohia project (named for a common indigenous tree), a grade school curriculum designed to increase understanding of Hawaii's ecology.

In February 1992, the Hawaii Department of Agriculture publicized a 1-week amnesty program encouraging residents to turn in illegal animals. The campaign netted 53 animals, including snakes, other reptiles and amphibians, harvester ants, hamsters, and birds (82).

The traveling public is singled out as an important target for educators. As one botanist puts it: "Tourists come for the scenery, but unless they've been educated, they won't care if the plants are native or not, just as long as the hills are green." There has been little effort to inform visitors of Hawaii's NIS problem by posters, amnesty buckets, or other means upon arrival, although a State-funded educational video began to be shown on flights of a few domestic carriers in 1992.

The brief video ("It Came From Beyond") takes a decidedly friendly approach to informing visitors about NIS and is expected to reduce the number of "innocent" introductions; some observers believe a stern approach emphasizing the law with its steep fines and penalties is necessary to reduce the potentially more harmful flow of smuggled species, which are probably more commonly brought in by residents with commercial or hobby interests.

Educational efforts in Hawaii also need to be developed and targeted to the State's diverse cultural and ethnic groups. An edible gourd-producing vine (*Coccinia grandis*) that has recently become a weed in Hawaii might have been intentionally brought in as a delicacy from Southeast Asia, for example.

COOPERATIVE EFFORTS

Finding:

In recent years, various groups in Hawaii—from State and Federal agencies, nongovernmental organizations, agriculture, and universities—have taken a strong interest in NIS. Increasingly, they view harmful NIS as a unifying threat.

Awareness of the widespread impact of damaging NIS in Hawaii has prompted a high degree of cooperation across diverse groups. One such effort involves an interagency agreement to research the biological control of forest weeds, an area that no agency was adequately addressing despite the spread of weeds like banana poka. The agreement involves the National Park Service; U.S. Forest Service; Hawaii's Division of Forestry and Wildlife and Department of Agriculture; and the University of Hawaii.

There is growing interest in Hawaii in expanding interagency cooperation to address the larger jurisdictional and informational gaps in the present system. Most of the agencies involved are supporting a plan by the Nature Conservancy of Hawaii and the Natural Resources Defense Council on improving interagency cooperation (86) (box 8-C). A single interagency system may prove more effective for Hawaii's particular needs than applying stop-gap measures to the existing approach.

NON-INDIGENOUS SPECIES IN FLORIDA

Finding:

The problems caused by non-indigenous species (NIS) in Florida are among the most severe in the United States. Certain features of

Box 8-C—A View From Hawaii: Recommendations of the Nature Conservancy and Natural Resources Defense Council

In 1992, the Nature Conservancy of Hawaii and the Natural Resources Defense Council released a detailed analysis of the "alien pest species invasion in Hawaii" and offered a plan to create a coordinated multiagency response to the problems, to be led by the Hawaii Department of Agriculture. It does not, however, advocate centralizing all inspection or other activities under one agency. The report stresses public education and involvement in curbing Hawaii's pest problems and identifies the following areas that need initial attention:

- Pre-entry prevention. Visa applications, importation permits, travel and tourist materials, mail order and shipping instructions, and similar materials should be reviewed with an eye to stopping pests at their origin. Similarly, international inspections and trade agreements should be reviewed and improved.
- Port-of-entry sampling and inspection. Methods for sampling and inspection should be developed to meet a standard of pest interceptions.
- Statutes, policy, and rules. Conflicts and gaps in authority should be identified and resolved. A clear system for allowing and prohibiting species should be created.
- Rapid response. Specific plans for dealing with new infestations should be created, including central reporting mechanisms, staffing and equipment concerns, contingency funding, and identification of priority pests.
- Statewide control. Federal, State, and private groups should collaborate in developing strategies to isolate or eradicate selected major pests.

The report further identifies several long-range needs, namely, joint training among agencies for inspection and response activities, coordinated information systems, coordinated research for prevention and control methods, and expanded public awareness campaigns. The pest prevention and control systems of New Zealand and Australia are highlighted as instructive models for Hawaii (see box 1-D).

SOURCE: The Nature Conservancy of Hawaii and Natural Resources Defense Council, "The Alien Pest Species Invasion in Hawaii: Background Study and Recommendations for Interagency Planning," July 1992.

the State have contributed to the problems: the subtropical climate; major ports of entry; burgeoning pet, aquarium, and ornamental plant industries; high rates of human immigration; increasing urbanization; and extensive environmental manipulation.

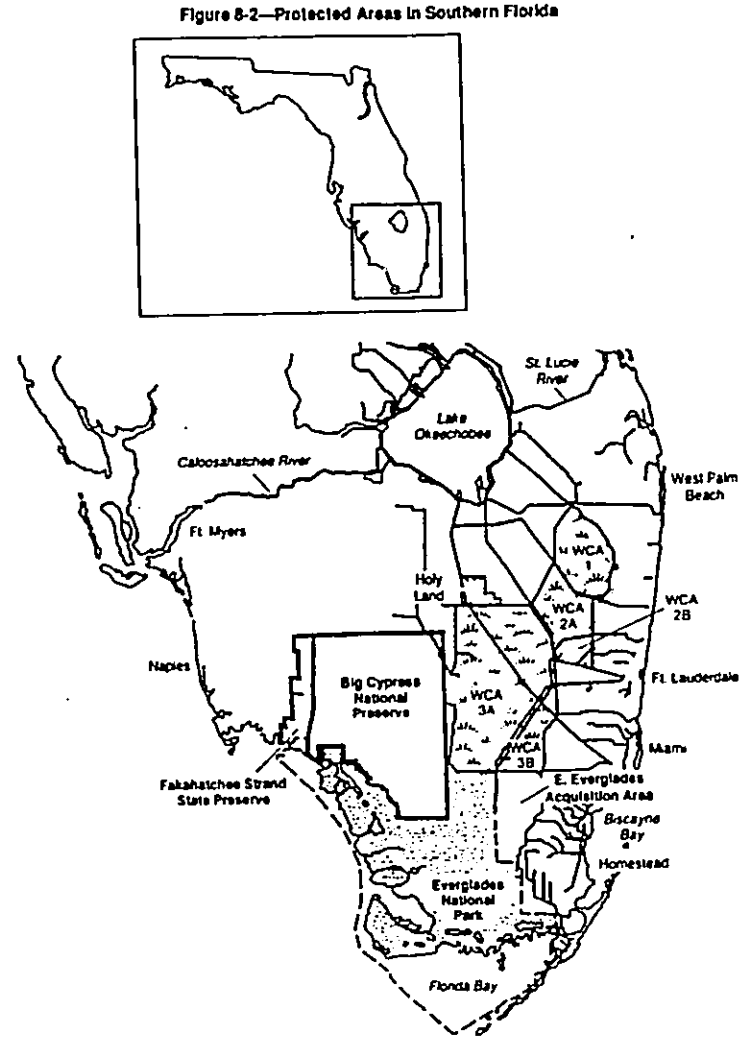
The Nature of the Problem

Florida is renowned for its mild climate, abundant waterways, beaches, and other natural attractions. Its freshwater lakes and streams afford recreation, navigation, commercial fishing, and wildlife habitat (57). Its major forest types, various mixtures of oak and pine (22), are crucial for wildlife as well as timber. South Florida contains one of the largest complexes of preserved ecosystems in the eastern United States, totaling about 3,500 square miles: Everglades National Park, Big Cypress National Preserve, Loxahatchee National Wildlife Refuge, and Fakahatchee Strand Preserve (figure 8-2).

South Florida also contains troublesome infestations of several aggressive non-indigenous plants, most of which were deliberately introduced (30). The State has approximately 925 established non-indigenous plant species (130). Non-indigenous plants and land mammals constitute about 25 percent of all species in the State (table 8-5). Sixty-three percent of the introduced non-indigenous bird species in the continental United States are found in Florida (1), which also has the largest number of established non-indigenous amphibian and reptile species in the United States (136).

Non-indigenous species cause severe ecological, economic, and resource management prob-

Figure 8-2—Protected Areas in Southern Florida



SOURCE: Adapted by OTA from M. Bodie, South Florida Water Management District, West Palm Beach, FL.

Table 8-5—Estimated Numbers of Non-Indigenous Species in Florida

Group	Established NIS	Total species
Plants	~925	3,450
Insects	271	
Freshwater snails	6	98
Land snails	40	140
Freshwater fish	19[a]	80
Amphibians	3	55
Reptiles	22	100
Birds	11[b]	607[c]
Land mammals	17	70

[a] Described as "established" and including one transplant; 4 other species are "possibly established," 8 are "formerly reproducing," and 41 are "collected without evidence of reproduction."

[b] Although only 11 are considered established, at least 140 have been classified as "free-flying exotics."

[c] Many birds found in Florida are migratory and do not breed there.

SOURCES: Compiled by the Office of Technology Assessment from: R. Ashton and P. Ashton, *Handbook of Reptiles and Amphibians of Florida*, Parts 1,2,3 (Miami, FL: Windward Publishers Inc., 1981, 1985, 1988); J.H. Frank and E.D. McCoy, "The Immigration of Insects to Florida, With A Tabulation of Records Published Since 1970," *Florida Entomologist*, vol. 75, No. 1, 1992, pp. 1-29; J.N. Layne, Checklist of Recent Florida Mammals, M9, 1987, 10 pp.; W.B. Robertson, Jr. and G.E. Woolfenden, *Florida Bird Species: An Annotated List*, Special Publication No. 6 of the Florida Ornithological Society, Gainesville, Florida, 1992, 260 pp.; P.L. Shelland, "Management of Introduced Freshwater Fishes in Florida," Proceedings of the 1990 Invitational Symposium/Workshop: New Directions in Research, Management and Conservation of Hawaiian Stream Ecosystems, Hawaii Dept. of Natural Resources, Div. of Aquatic Resources, Honolulu, HI, 1991; L.A. Stange, "Snails and Slugs of Florida," *Florida Garden Guide*, January/February 1990, pp. 1-2; D.R. Thompson, APHIS/USDA, personal communication, May 27, 1992; D.B. Ward, "How Many Plant Species Are Native to Florida?" *Palmetto*, winter 88/90, 1989-90; and L.D. Wilson, Professor of Biology, Miami Dade Community College, Miami, FL, personal communication to D.W. Johnston.

lems in the State. They have had negative impacts on fishing and water sports and have degraded wildlife habitat, decreased biological diversity, and altered natural ecosystems. Future harmful effects on agriculture and human health can be anticipated from continued immigrations of insects and plant pathogens (39), as well as continued range expansion of established NIS (81).

Disturbed areas—construction sites, abandoned farm land, drained or stressed wetlands, roadsides, and canals and ditches—are often the sites where NIS gain footholds and eventually become established. In such areas NIS often displace indigenous forms, thus altering ecosystem dynamics. Debate persists as to whether NIS become established by actively out-competing and displacing indigenous species even in undisturbed areas or whether they primarily colonize disturbed habitats that are no longer optimum sites for indigenous species. In many south Florida urban and suburban sites, a lizard, the invasive Cuban brown anole (*Anolis sagrei*) has out-competed, and thereby replaced, the indigenous green anole (*Anolis carolinensis*) (136). Undisturbed areas are difficult for many NIS to colonize, but most of Florida's natural areas and waterways have experienced disturbance in some varying degrees, thus making them prone to NIS invasions (35,81).

Other conditions in Florida favor the introduction and establishment of NIS. The State has a subtropical climate and prolonged growing season; abundant freshwater resources; large and growing industries of aquaculture, ornamental and nursery plants, and the pet trade; a thriving tourist industry; and cargo flights originating in Central and South America (102).

- Subtropical Climate. Florida's subtropical climate is attractive to people and to certain industries, such as those dealing with ornamental and aquarium plants. The climate is moderated by large bodies of water on three sides. Furthermore, Florida is as close to the equator as is any conterminous State, so that most of it is in the humid subtropical climatic zone; the southern tip, from approximately Lake Okeechobee southward, is tropical savanna, the only such zone in the United States (22). Areas in this last zone are always hot, with alternate dry and wet seasons.

The State has an average annual maximum temperature of 82 degrees F and an average annual minimum temperature of 63 degrees F (137). Winter temperatures (40 degrees F and lower), especially in south-central Florida, probably limit the northward dispersal of many NIS (100,103,136). Florida is one of the wettest States, with an average annual rainfall of 53

inches (60 or more inches in southeastern and panhandle parts). This climate is conducive to the establishment of many NIS of tropical origin. Florida is also subject to tropical weather systems, such as 1992's Hurricane Andrew, which can facilitate the spread of NIS through disturbance (box 8-D).

- Routes of Entry. Florida has numerous pathways of entry for NIS. Large numbers of plants (333 million in 1990) and animals pass through Miami International Airport each year, the shipments originating chiefly in Latin America; 85 percent of all plant shipments into the United States pass through the Miami Inspection Station (118). The shipments are destined for a great variety of ornamental, nursery, and landscaping businesses; the aquarium industry; and commercial pet trade. This influx of NIS sets the stage for potential escapes and unintentional and intentional releases.

Unintentional releases and escapes from animal dealers, aquaculture, subsequent purchasers, public and private collections, and tourist attractions have been documented (92,95). Specific examples of harmful or potentially harmful species are the African giant snail (*Achatina fulica*) (111), cane toad (*Bufo marinus*) (136), and monk parakeet (*Myiopsitta monachus*) (95).

Deliberate introductions for sport, biological control, food, pharmaceutical material or dyestuffs, ornamental uses, and aesthetics are also well known in Florida (98). In the 1800s and early 1900s, botanist David Fairchild imported large volumes of non-indigenous plants into Florida (96). Since 1900, the most disastrous deliberate introduction has been that of melaleuca (*Melaleuca quinquenervia*), a fast-growing tree brought in to dry out the swamplands of south Florida. Another tree, Brazilian pepper (*Schinus terebinthifolius*), introduced for its showy foliage, is also spreading rapidly in south Florida. At least two introduced aquatic plants continue to cause extensive ecological and economic damage: hydrilla (*Hydrilla verticillata*) and the showy water hyacinth (*Eichhornia crassipes*) (97). Plant pathogens and other stowaways have concomitantly gained entry through importation of foodstuffs and plants on ships or aircraft (28).

In the 19th century and as late as 1941, several insects, such as mole crickets (*Scapteriscus vicinus* and *S. acletus*) and a variety of beetles, probably arrived in ship ballast (96). For most non-indigenous plants and some animals, however, the exact path of entry into the State is unknown.

- Industries Dealing With NIS. Several industries have played large direct or indirect roles in the introduction of harmful NIS into Florida. A $1 billion woody ornamental industry continues to import large numbers of plants for landscaping and shade. A few woody ornamentals, such as Australian pine (*Casuarina equisetifolia*) and Brazilian pepper, have become major pest plants in Florida (79). Florida's aquaculture industry is the largest of any state; tropical fish and aquarium plants shipped from Florida are valued at $170 million annually, according to the Florida Tropical Fish Farms Association. Most of Florida's 19 non-indigenous fish species escaped from aquarium fish culture facilities (25). The aquarium plant trade introduced hydrilla into canals near Tampa about 1950, and later into Miami canals and the Crystal River (58). Pet merchants and pet owners have been implicated in the escape of tropical birds, reptiles, and mammals (92,122).
- Human Population Growth. Florida continues to be one of the fastest growing States: its 1990 population totaled 12.9 million, an increase of 32.8 percent since 1980 (127). Population growth over the years has increased pressure to develop more land and to make adequate water supplies available. Most of the natural ecosystems of south Florida have been severely altered. The disturbed areas—urban, suburban, and rural—have become prime sites for colonization by non-indigenous plants and animals.

Box 8-D—Non-Indigenous Species and the Effects of Hurricane Andrew

On the morning of August 24, 1992, the small but intense Hurricane Andrew cut a 25-mile swath across south Florida from the Dade County coast westward to Monroe County's west coast. Although total rainfall was relatively light (5 inches or less), maximum sustained winds were 135 to 140 miles per hour and gusts exceeded 164 miles per hour. Estimates of property damage to urban and suburban sites reached $20 billion, thus ranking Hurricane Andrew as among the costliest natural disasters in U.S. history. Natural areas were also affected. The hurricane caused an estimated $51 million in damage at Everglades and Biscayne National Parks and Big Cypress National Preserve.

A large number of non-indigenous animals escaped from captivity when zoos, pet stores, and tropical fish farms were destroyed. Escapees included fish, lizards, nonvenomous snakes, birds, and primates (e.g., some 500 macaque monkeys and 20 baboons).

Based on knowledge of the ecology of non-indigenous trees in south Florida and their invasions enhanced by two previous hurricanes (Donna in 1960 and Betsy in 1965), a significant increase in the spread of some non-indigenous plants can be predicted for the next few years. The hurricane spread melaleuca seeds (*Melaleuca quinquenervia*) and other non-indigenous plants in its path, thus setting back years of efforts to control melaleuca in the East Everglades. Newly disturbed natural communities in south Florida will be more susceptible to invasions. Other potential problems might come from escaped non-indigenous invertebrates and plants that are not already established in south Florida.

As a direct result of the hurricane, Florida's Department of Natural Resources estimates that mechanical and chemical control of non-indigenous plants over the next 5 years will cost $14 million, approximately tripling costs. Because those control measures might not completely eliminate harmful NIS, the Department recommends that biological control agents be introduced as quickly as possible. For species of primary concern in the aftermath of the hurricane—melaleuca, Australian pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolius*), lather leaf (*Colubrina asiatica*), and air potato (*Dioscorea bulbifera*)—funding for research, quarantine and grow-out facilities are estimated to be $53 million over the next 10 years.

SOURCES: A. DePalma, "Storm Offers Chance to Rethink Everglades," *The New York Times*, Sept. 29, 1992, p. A14; G.E. Davis et al. (eds.), "Assessment of Hurricane Andrew Impacts on Natural and Archaeological Resources of Big Cypress National Preserve," Biscayne National Park, and Everglades National Park, Draft Report, U.S. National Park Service, Atlanta, GA, Sept. 15-24, 1992; *Exotic Pest Plant Council Newsletter*, vol. 2, No. 3, fall 1992; Florida Game and Fresh Water Fish Commission, "Effects of Hurricane Andrew on Fish and Wildlife of South Florida: A Preliminary Assessment," Tallahassee, FL, Sept. 25, 1992; D. Schmitz, personal communication to Office of Technology Assessment, Jan. 21, 1993.

Causes and Consequences

Findings:

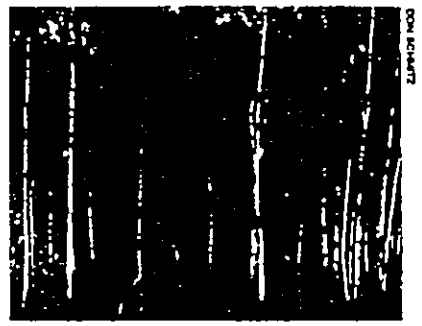
Natural habitats, especially in south Florida, have been altered or lost by drainage and water storage projects, urban and suburban land development, and land reclamation for agriculture. Harmful NIS often invade and become established in altered ecosystems from which they can invade surrounding areas.

Invasive NIS in the State have disrupted navigation and recreational activities, displaced indigenous wildlife and their habitats, and reduced biological diversity. Severe ecological and economic impacts from several aquatic plants, such as hydrilla and water hyacinth, and trees, such as melaleuca and Brazilian pepper, have been documented.

The most conspicuous non-indigenous plants in Florida are aquatic weeds (e.g., water hyacinth and hydrilla) and trees (melaleuca, Australian pine, and Brazilian pepper). Their success is due to their ecological characteristics as well as the condition of the ecosystem being invaded. In disturbed ecosystems, NIS are sometimes better adapted than indigenous species. Aquatic plants have clogged waterways, hindered navigation, disrupted fishing and water sports, and smothered natural vegetation. In drier habitats, invasive trees

have often created monocultures, displacing indigenous species, decreasing biological diversity, and destroying wildlife habitats. Insects, pathogens, and nematodes have caused damage to agricultural crops. Several invading plants and insects have created public health problems.

Invasion and establishment of many non-indigenous plants and animals is closely related to the degree of ecosystem disruption. Alterations to accommodate water management projects, human population growth, and agriculture have been especially important (81,98).



DON SCHMITZ

*Altered hydrology in south Florida has been linked to the spread of non-indigenous fish, aquatic plants, and trees—such as melaleuca (*Melaleuca quinquenervia*).*

WATER MANAGEMENT IN SOUTH FLORIDA

Water management programs in the southeastern part of the State have greatly contributed to the spread of non-indigenous plants and fishes (83). Waterways and marshes were among the first natural systems in Florida to be affected by increasing numbers of people because of demands for irrigation, urban water supplies, and recreation.

As early as 1907, drainage of south Florida's Everglades was promoted for land reclamation, to reduce flooding, and to supply water to developing southeastern coastal cities (42). Drainage was accelerated in the 1930s, and by 1947, the U.S. Army Corps of Engineers had created the Everglades Agricultural Area and a plan for management of Everglades' waters, thus laying the base for the vast urban areas now found on Florida's southeast coast. Areas along the eastern margin of the Everglades, critical to movement of its waters underground, are now drained and paved.

Today, a complex network of canals, dams, pumping stations, and levees stretches from Lake Okeechobee to southern Dade County, just east of Everglades National Park (119). This network—80 percent of it federally funded and built by the Corps of Engineers—now controls flooding and diverts large volumes of water for agriculture and coastal urban areas. Half the Everglades—once occupying about 3,600 square miles, perhaps the largest wetland in North America—is now farms, groves, pastures, and cities. The remaining fragments of natural communities now function so poorly that plant and animal life suffers as water and food supplies are diminished, distorted, and polluted (132).

Altered hydrology in the East Everglades has been linked to the spread of non-indigenous trees such as melaleuca (104). This alteration of the natural water flow has decreased populations of nesting wading birds (92) and accelerated the proliferation and spread of non-indigenous fishes and aquatic plants (24,59,60,102).

Some 700,000 acres of agricultural land just south of Lake Okeechobee—nearly two-thirds of it in sugar cane—not only use much of south Florida's water, but also release run-off contaminated with nitrogen and phosphorus (105). Excessive growth of hydrilla and other plants has been linked to this increased pollution (15).

URBANIZATION

Florida's population in 1990 was concentrated in three principal areas: Miami-Fort Lauderdale (3.19 million), Tampa-St. Petersburg (2.1 million), and Orlando (1.1 million) (127). Natural areas, such as the Atlantic Coastal Ridge and scrub communities, have been developed to supply urban demands for house sites, municipal

services, and landscaping. Many urban sites in south Florida have become dominated by NIS, especially ornamental plants, birds, and fishes (23,59,122,136).

Many non-indigenous animal species are today found chiefly or entirely in urban and suburban areas of south Florida. Collectors, hobbyists, and pet owners have deliberately or accidentally released tropical fish, mammals, birds, reptiles, and invertebrates into urban and suburban settings where they find plentiful food, breeding sites, shelter, and a subtropical climate conducive to growth and reproduction (25,31,72,95,136). In cities, non-indigenous birds such as parrots have few predators, diseases, or parasites (122). At ports of entry, such as Miami, stowaway insects and other invertebrates have escaped from their imported hosts (28). The Asian tiger mosquito (*Aedes albopictus*) commonly breeds in water that collects in waste tire dumps and flower pots in cemeteries (89).

THE SPREAD OF MELALEUCA

The last three decades have been marked by an explosive invasion of melaleuca across south Florida (53), where some 450,000 acres are infested (73). In 1983, its estimated rate of spread was 8 acres per day, but less than a decade later the rate is estimated to be 50 acres per day. Thus, melaleuca has the potential to invade all of south Florida's wetlands within the next 50 years (37).

Indigenous to Australia, melaleuca's release from natural competitors, predators, and disease and its characteristics of prolific seed production and adaptation to fire have facilitated its spread. Its monocultures have replaced sawgrass marshes, sloughs, forests, and other natural habitats to the extent that melaleuca is now regarded as the most serious threat to the integrity of all south Florida's natural systems (74).

Because of its proximity to the numerous melaleuca plantings in the urban areas of the Palm Beaches, Loxahatchee National Wildlife Refuge has one of the most severe infestations of melaleuca anywhere in the Everglades. The trees were rare in the 1960s, but by 1990, 14 percent of the refuge was moderately to heavily infested (36). Moderate to heavy infestations also occur in Big Cypress National Preserve, the eastern half of the East Everglades Acquisition area, in marshes of Okeechobee, in large areas of Broward and Dade counties east of the Everglades, and in an area designated Water Conservation Area 2-B. Equally severe problems exist on the west coast of Florida from Charlotte Harbor to U.S. Highway 41 (74).

ECONOMIC COSTS

The various control programs for melaleuca have been expensive. Since 1986, 2 million melaleuca and Australian pine stems have been treated in the East Everglades at a cost of $287,000 for helicopter services and herbicides (104). Melaleuca management costs in the Big Cypress National Preserve were $60,000 in 1989. Costs for mechanical removal of trees range from $500 to $2,000 per acre. Estimated melaleuca management costs in recent years for Water Conservation Areas 2-A, 2-B, 3 in south Florida, and Lake Okeechobee have been nearly $1 million annually (74).

One estimate in 1991 placed the cost of melaleuca removal in Florida at $1.3 million. For fiscal year 1992 the estimated expenditures for herbicide and mechanical control of melaleuca were $720,000 in the South Florida Water Management District, $150,000 in Loxahatchee National Wildlife Refuge, and $180,000 in Everglades National Park (117). Based on the current rate of expansion, in one water conservation area alone, complete eradication of melaleuca with herbicides and mechanical removal would cost $12.9 million over 5 years (117).

The benefits and costs for removal of melaleuca have been estimated (29). The total annual benefits, especially to tourism, of preventing a complete infestation of melaleuca would be $168.6 million, whereas the resulting losses in honey production and pollination services (the tree provides honey bees with nectar) would cost

only $15 million. Thus, eradication of melaleuca would greatly benefit the State's economy, according to this analysis, although some of its assumptions may inflate the benefits (21).

Florida has experienced severe economic impacts from other NIS as well. The economic impact of hydrilla on tourism and recreational fishing can be staggering. For example, a study of Orange Lake in north central Florida indicated that the economic activity on the lake was almost $11 million annually, but in years when hydrilla covers the lake, these benefits are all but lost (63). During the 1980s, statewide costs for controlling hydrilla totaled approximately $50 million (98). Today hydrilla is the most costly aquatic plant to manage, with an annual expenditure of $7 million. Since 1980, management of all non-indigenous aquatic plants by State and Federal agencies has cost $120 million (98).

Consequences to the State's agriculture also have been documented. The value of citrus crops in Florida from 1955 to 1985 totaled $13.5 billion. An estimated 15 percent of the citrus was lost because of the burrowing and citrus nematodes (*Radopholus similis, Tylenchulus semipenetrans*), with an average annual estimated cost of $77 million (33). While the nematodes' origins are not certain, experts speculate that one or both are non-indigenous. Fire ants (*Solenopsis invicta*) from South America have extensively damaged eggplants, soybeans, and potatoes. Brazilian pepper growing in proximity to agricultural areas is believed to support large populations of vegetable-damaging insects, especially when vegetable crops are nearing harvest (19). In 1984, the cost of damage and control of mole crickets in Florida, Georgia, Louisiana, and Alabama was about $45 million, with most of the cost to Florida. By 1986, the losses had risen to $77 million for turf grasses alone (38).

From 1957 to 1991, NIS eradication and control programs cost $31 million for citrus canker (*Xanthomas camestris* pv. *citri*), $11 million for fire ants, and $10 million for citrus blackfly (*Aleurocanthus woglumi*). In 1990 and 1991, Mediterranean fruit fly (medfly) eradication programs totaled $0.5 million, according to the Florida Department of Agriculture and Consumer Services.

POTENTIAL OR ACTUAL HEALTH CONSEQUENCES

Many NIS have been linked to human health problems, and an increasing number of incidents are reported annually in the growing urban areas. Very common trees, such as melaleuca and Brazilian pepper, can cause contact dermatitis, allergies, and respiratory problems. A large number of other cultivated and established plants in Florida contain some poisonous compounds (3).

The Asian tiger mosquito, now in virtually all Florida counties, can carry dengue fever and a form of equine encephalitis virus (39) (ch. 10). In addition to their agricultural impacts, non-indigenous fire ants can cause stings, allergic reactions, and secondary infections in people.

EFFECTS ON ENDANGERED SPECIES

Non-indigenous aquatic plants are threatening the integrity of habitats occupied by certain endangered and threatened species in Florida. Both water hyacinth and water lettuce (*Pistia stratiotes*) can cover surface waters, thus hampering efforts of the endangered snail kite (*Rostrhamus sociabilis*) to find its prey (116). Non-indigenous trees are invading habitats of the endangered Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*). Australian pines have interfered with nesting of endangered and threatened sea turtles (84); on the other hand, they have improved nesting conditions for the American oyster catcher (*Haematopus palliatus*) (121). The endangered beach mouse (*Peromyscus polionotus phasma*) and key deer (*Odocoileus virginianus clavium*) are subject to predation by feral cats or dogs (4). Populations of the endangered Okaloosa darter (*Etheostoma okaloosae*) have been reduced because of competition from the introduced brown darter (*E. edwini*) (14).

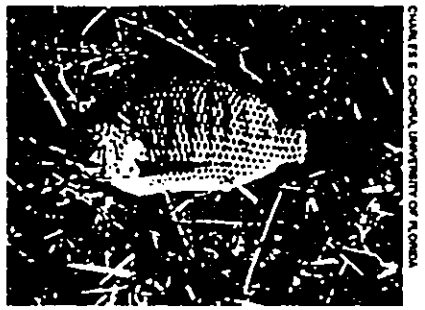
CONFLICTING INTERESTS ON NON-INDIGENOUS SPECIES

The introduction of certain NIS into Florida has resulted in conflicts between agencies and user groups. Grass carp (*Ctenopharyngodon idella*) were introduced to control aquatic weeds (115), but the carp shows a preference for important waterfowl food plants, thus apparently causing declines in waterfowl populations (134). Peacock bass (*Cichla* spp.) were introduced to control other non-indigenous fish and as a game fish in southeast Florida canals (101), but the bass is slowly reducing populations of indigenous bass and bream (73). Perhaps the most troublesome of the 19 non-indigenous fish species is the blue tilapia (*Tilapia aurea*), introduced by the Florida Game and Fresh Water Fish Commission as a possible weed-control and sport fish. Blue tilapia competes directly with indigenous fishes and is now established in 18 Florida counties (73).

Hunters value wild hogs (*Sus scrofa*) as game, and management and relocation programs are common in Florida. Yet wild hogs have detrimental effects on terrestrial habitats and are probable public health threats (parasites and diseases) (9).

Certain aquatic plants frequently categorized as pest species may be beneficial for wildlife. Despite extensive, costly efforts to control or eradicate hydrilla, some hunters like the plant because it is an important duck food and its mats provide habitats for wintering waterfowl (44,57). At least in small amounts, it is also believed to improve sport fishing (76).

Aside from those species introduced for biological control or sport, some NIS in Florida benefit people and wildlife. The aesthetic values of colorful tropical birds are intangible, but are important to urban dwellers in an otherwise less colorful environment (92). Avid birdwatchers travel to the Miami area to observe its non-indigenous avifauna (122). The importance of NIS as food for indigenous wildlife is only partly understood, but the endangered Florida panther (*Felis concolor coryi*) feeds on non-indigenous



CHARLES E. CICHRA, UNIVERSITY OF FLORIDA

Blue tilapia (Tilapia aurea) is among the most troublesome of Florida's 19 non-indigenous fish species.

wild hogs and nine-banded armadillos (*Dasypus novemcinctus*), whose negative environmental impacts have been documented (18,72).

Non-indigenous ornamental shrubs and trees are in great demand for landscaping (because of their showy leaves or flowers), fruit, and shade from the intense sunlight of south Florida (79). Many species of introduced fig trees (*Ficus* spp.) line southeastern Florida's roadsides, and Australian pines offer shade along beach fronts.

POTENTIAL FUTURE IMPACTS OF NON-INDIGENOUS SPECIES

Biologists and ecologists caution that many poorly studied NIS have the potential of becoming agricultural pests, transmitting diseases, or displacing indigenous species. Potentially serious pests include Cogon grass (*Imperata cylindrica*), which is invading pine forests (81); about 20 recent insect immigrants (39); the Asiatic clam (*Corbicula manilensis*) (87); catclaw mimosa (*Mimosa pigra* var. *pigra*), a highly invasive plant of disturbed areas; the disease-carrying Asian tiger mosquito; and African honey bees (*Apis mellifera scutellata*), predicted to be in Florida by 1994.

Searching for Solutions

Findings:

Florida's Exotic Pest Plant Council has provided an effective forum for the exchange of ideas and conflict resolution concerning NIS. It has identified the most invasive NIS and involved policymakers in its discussions.

Florida's extensive problems with NIS and its high human immigration rate suggest that public education is vital to the management or eradication of NIS in the State.

SPECIFIC MANAGEMENT PROGRAMS

The Exotic Pest Plant Council (EPPC) was the first multiorganizational effort in Florida to control non-indigenous water weeds because of the growing environmental threats posed by pest plants that were crossing political and jurisdictional boundaries. EPPC is an organization of 40 member agencies, and local and private groups. Through frequent meetings, a newsletter, and other publications, EPPC promotes coordinated efforts in developing management programs. It also assists in writing appropriate legislation; pushes for State and Federal funds to manage invasive plants in wetlands and upland forests; and organizes symposia to bring together scientists, policymakers, and the public to exchange information and formulate plans (30).

EPPC assisted in coordinating efforts by the National Park Service, Dade County Department of Environmental Resource Management, South Florida Water Management District, and the Florida Department of Corrections to establish and maintain a melaleuca-free buffer zone along the eastern boundary of Everglades National Park (the East Everglades).

Because of melaleuca's highly invasive nature, its control and eradication have received top priority in the East Everglades, South Florida Water Management District, Loxahatchee National Wildlife Refuge, and other sites in south Florida. At least three techniques are currently in use: manual removal of seedlings and young trees, mechanical removal of older trees, and herbicides (62).

The future use of biological control agents has been identified as one of the keys to effective, long-lasting management of melaleuca (5). Major efforts are under way to identify natural controls for melaleuca, both in the United States and Australia. Even after biological control agents are identified, several years must pass before their effectiveness can be determined. Meanwhile, herbicidal and mechanical control will be needed to arrest further spread of the tree (74).

Control of Australian pine and Brazilian pepper demands a combination of mechanical removal and herbicides. Hydrilla is currently managed at considerable cost with herbicides and mechanical removal and in some cases with sterile triploid grass carp. At one time, water hyacinth infested more than 120,000 acres of Florida waterways. Herbicidal and mechanical controls have limited the plant to less than 3,000 acres in public waters (98). Three natural enemies, the bagoine weevil (*Bagous affinis*) and two leaf-mining flies (*Hydrellia* spp.), also show some promise in controlling hydrilla (62). Management of these and other species would benefit from increased coordination.

Several other control and eradication projects have been successful in Florida. In the mid-1980s at least 18 million young citrus trees were destroyed to eradicate citrus canker (99). Other species successfully eradicated include the medfly; the giant African snail; and 13 species of insects, viruses, and rusts, according to the Division of Plant Industry in Florida.

LONG-TERM NEEDS

Resource managers in Florida stress that successful management and eradication programs for existing and future problem NIS in Florida will require an educated public along with coordination among agencies, long-range planning, and consistent funding.

Inventories of existing harmful NIS, their distribution, and impacts in the State are needed

The critically endangered Florida panther (Felis concolor coryi) and other indigenous species rely on remnants of undisturbed habitat that are susceptible to damage by non-indigenous species.

to develop priorities for management. Early detection of damages enhances the probability of success in controlling any pest (20). Because the establishment and spread of any NIS may be due to a lack of natural enemies, the search for biological control agents is an important consideration.

Relatively undisturbed ecosystems in Florida are fast disappearing and are usually represented by small fragments of their original extent. These areas warrant special attention to protect them from injurious NIS. The State needs to enhance strategies for controlling or eradicating injurious non-indigenous animals such as wild hogs (75).

Ample evidence indicates that the existing management of water flow through the Everglades has altered hydroperiods and contributed to the invasion of non-indigenous trees. A new design and management of water flow would be needed to restore a natural water regime, one that would protect the quality and quantity of water feeding the Everglades (34).

Some aspects of water quality management in the Everglades, especially those related to phosphorus, are being addressed now. In 1988, the U.S. Department of Justice sued the Florida Department of Environmental Regulation and the South Florida Water Management District for not enforcing water quality standards for water entering Everglades National Park. In July 1993, these parties, along with agricultural interests, environmental groups, and Indian tribes, agreed to a mediated framework for a 20-year, $465 million restoration and clean up plan. The impact of these efforts on harmful NIS will not be clear for some time.

COORDINATED EFFORTS FOR MANAGING NIS

Centers or councils to coordinate the work of various agencies and industries could be of help in developing and implementing effective management of harmful NIS. They might also encourage statewide resource protection, public awareness, and consistency in policies, goals, administration, and control methods. The structure and operations of the Exotic Pest Plant Council could be used as a model for coordinating work on pestiferous fish and insects, for example. A planned "Center for Excellence," combining expertise from the University of Florida, Division of Plant Industry, and the U.S. Department of Agriculture, also shows promise in coordinating biological control research and implementation in the State, especially for agricultural crops.

FUNDING FOR RESEARCH, MANAGEMENT, AND BIOLOGICAL CONTROL

Except for a few highly invasive aquatic plants and trees, little biological and ecological information is available for most of Florida's NIS. Equally lacking are data on natural enemies of the species and ecological data for the ecosystem likely to be invaded. Without the necessary research to reveal this information, effective programs of control, management, and eradication cannot be fully developed nor expected to be successful.

For the most part, funding for management and research of NIS in Florida has been piecemeal and often inadequate for programs to achieve maximum success. For example, management programs for noxious weeds and biological control research are said to have been underfunded and short-term. Current quarantine facilities for biological control research are inadequate, thus hampering efforts to control melaleuca and other species. Development and implementation of strategies to arrest further spread of NIS and to decrease their environmental impacts would require consistent, adequate funding.

PUBLIC EDUCATION

Florida's continuing population growth and tourist influx plus the magnitude of the impacts from harmful NIS suggest that public education and awareness programs could be intensified to prevent new introductions. Such programs could be targeted toward unintentional and intentional introductions, including ornamental plants, aquarium fishes, other pets, and insects. Attempts could be made to discourage the planting of invasive ornamental species and to warn of the need to control their spread. The major biological and economic impacts of melaleuca, water hyacinth, and hydrilla could be widely publicized to encourage support for management issues. The importance of protecting remaining natural communities warrants emphasis, especially since undisturbed ecosystems can serve as barriers against the spread of NIS.

CHAPTER REVIEW

Virtually all parts of the country face problems related to harmful NIS, but Hawaii and Florida have been particularly hard hit. Both States have large numbers of established NIS, constituting significant proportions of their flora and fauna, and including numerous high-impact species. Many harm natural areas that are unique or otherwise special reservoirs of the Nation's biological heritage. Both Hawaii and Florida have turned to cooperative, interagency mechanisms and public education to address their particular problems with NIS. Federal action and inaction have sometimes hindered the States' efforts. Lessons learned in these States are likely to serve well elsewhere. The situation in Hawaii and Florida, while unusual in some ways, nevertheless heralds what other States face as numbers of harmful NIS climb and people become more aware of their damage.

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Comments on Draft Environmental Impact Statement and Public Hearing Testimony

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NOTICE OF PUBLIC HEARING

Pursuant to Section 509(b)(6) of the Airport and Airway Improvement Act of 1982, as amended, notice is hereby given that the State of Hawaii, Department of Transportation, Airports Division is considering the potential environmental impacts of the proposed Kahului Airport master plan improvements, including but not limited to:

1. Extend and strengthen Runway 2/20 from 7,000 feet to 9,600 feet.
2. Relocate the Instrument Land System (ILS) and Approach Lighting System (ALS) on Runway 2.
3. Construct a new airport access road.
4. Land acquisition.
5. Construct parallel Runway 2R/20L (long range).
6. Commercial and general aviation facilities such as aircraft parking aprons, taxiways, navigational aids, etc.
7. Jet blast protection.
8. Interim helicopter facility bulk fuel facility.

A Draft Environmental Impact Statement (EIS) has been prepared by the U.S. Department of Transportation, Federal Aviation Administration (FAA) and the State of Hawaii, Department of Transportation, Airports Division in accordance with the National Environmental Policy Act of 1969 and Hawaii Revised Statutes, Chapter 343 for the proposed development. Copies of the Draft EIS are available for public examination at the Kahului Airport District Manager's Office, and all State Public Libraries in Maui County.

A Public Hearing on the Draft EIS will be held Wednesday May 8, 1996, at 7:00 p.m. Hawaiian Standard Time, in the Kahului Airport Terminal, Gate 39. All interested persons are invited to attend.

Attendance at the public hearing is not a prerequisite for submission of testimony. Written testimony which is received by the FAA and State Airports Division will be included with the transcripts of the hearing and will be considered in the evaluation of the proposed action. Written testimony should be submitted to the following address on or before May 23, 1996:

Federal Aviation Administration
Honolulu Airports District Office
Attention: David J. Welbouse
Box 50244
Honolulu, Hawaii 96850
Phone: (808) 541-1243

Meeting location is disability accessible. Should you need additional assistance for other disabilities, for example, sign language interpretation and large type print, please contact the Department of Transportation, Airports Division at 838-8810 at least five (5) working days before the scheduled hearing.

Kazu Hayashida
Director of Transportation
(Hon. Adv.: Apr. 7, 1996) (A-38587)

EXHIBIT V-1. NOTICE OF PUBLIC HEARING, HONOLULU ADVERTISER

NOTICE OF PUBLIC HEARING

Pursuant to Section 509(b)(6) of the Airport and Airway Improvement Act of 1982, as amended, notice is hereby given that the State of Hawaii, Department of Transportation, Airports Division is considering the potential environmental impacts of the proposed Kahului Airport master plan improvements, including but not limited to:

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A Draft Environmental Impact Statement (EIS) has been prepared by the U.S. Department of Transportation, Federal Aviation Administration (FAA) and the State of Hawaii, Department of Transportation, Airports Division in accordance with the National Environmental Policy Act of 1969 and Hawaii Revised Statutes, Chapter 343 for the proposed development. Copies of the Draft EIS are available for public examination at the Kahului Airport District Manager's Office, and all State Public Libraries in Maui County.

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Attendance at the public hearing is not a prerequisite for submission of testimony. Written testimony which is received by the FAA and State Airports Division will be included with the transcripts of the hearing and will be considered in the evaluation of the proposed action. Written testimony should be submitted to the following address on or before May 23, 1996:

Federal Aviation Administration
Honolulu Airports District Office
Attention: David J. Welhouse
Box 50244
Honolulu, Hawaii 96850
Phone: (808) 541-1243

Meeting location is disability accessible. Should you need additional assistance for other disabilities, for example, sign language interpretation and large type print, please contact the Department of Transportation, Airports Division at 838-8810 at least five (5) working days before the scheduled hearing.

Kazu Hayashida
Director of Transportation
(Hon.S.-B.: Apr. 17, 1996) (SB-4721)

EXHIBIT V-2. NOTICE OF PUBLIC HEARING, HONOLULU STAR BULLETIN

NOTICE OF PUBLIC HEARING

Pursuant to Section 509(b)(6) of the Airport and Airway Improvement Act of 1982, as amended, notice is hereby given that the State of Hawaii, Department of Transportation, Airports Division is considering the potential environmental impacts of the proposed Kahului Airport master plan improvements, including but not limited to:

1. Extend and strengthen Runway 2/20 from 7,000 feet to 9,600 feet.
2. Relocate the Instrument Landing System (ILS) and Approach Lighting System (ALS) on Runway 2.
3. Construct a new airport access road.
4. Land acquisition.
5. Construct parallel Runway 2R/20L (long range).
6. Commercial and general aviation facilities such as aircraft parking aprons, taxiways, navigational aids, etc.
7. Jet blast protection.
8. Interim helicopter facility bulk fuel facility.

A *Draft Environmental Impact Statement (EIS)* has been prepared by the U.S. Department of Transportation, Federal Aviation Administration (FAA) and the State of Hawaii, Department of Transportation, Airports Division in accordance with the National Environmental Policy Act of 1969 and Hawaii Revised Statutes, Chapter 343 for the proposed development. Copies of the Draft EIS are available for public examination at the Kahului Airport District Manager's Office, and all State Public Libraries in Maui County.

A Public Hearing on the Draft EIS will be held Wednesday, May 8, 1996, at 7:00 p.m. Hawaiian Standard Time, in the Kahului Airport Terminal, Gate 39. All interested persons are invited to attend.

Attendance at the public hearing is not a prerequisite for submission of testimony. Written testimony which is received by the FAA and State Airports Division will be included with the transcripts of the hearing and will be considered in the evaluation of the proposed action. Written testimony should be submitted to the following address on or before May 2, 1996:

Federal Aviation Administration
Honolulu Airports District Office
Attention: David J. Welhouse
Box 50244
Honolulu, Hawaii 96850
Phone: (808) 541-1243

Meeting location is disability accessible. Should you need additional assistance for other disabilities, for example, sign language interpretation and large type print, please contact the Department of Transportation, Airports Division at 838-8810 at least five (5) working days before the scheduled hearing.

(sgd.) Glenn M. Okimoto
for Kazu Hayashida
Director of Transportation

(MN: Apr. 7, 17, 1996)

EXHIBIT V-3. NOTICE OF PUBLIC HEARING, MAUI NEWS

NEWS

Federal Aviation Administration
Public Affairs Office
1601 Lind Ave., SW
Renton, Wash. 98055-4056
206/227-2005

Alaska☆Arizona☆California☆Colorado☆Hawaii☆Idaho☆Montana☆Nevada☆Oregon☆Utah☆Washington☆Wyoming

June 11, 1996
Rel. No. 96-31
More information - Mitch Barker 206 / 227-1203
For immediate release:

Kahului comment period extended

The public comment period for review of the Draft Environmental Impact Statement (DEIS) on proposed Kahului Airport master plan improvements has been extended.

The comment period originally expired May 23. It has been extended to June 22, 1996.

The DEIS includes several proposed improvements:

1. Extended and strengthen Runway 2/20 from 7,000 feet to 9,600 feet.
2. Relocate the Instrument Landing System (ILS) and Approach Lighting System (ALS) on Runway 2.
3. Construct a new airport access road.
4. Land acquisition
5. Construct parallel Runway 2R/20L (long range).
6. Commercial and general aviation facilities such as aircraft parking aprons, taxiways, navigational aids, etc.
7. Jet blast protection.
8. Interim helicopter facility.

The DEIS has been prepared by the FAA and the State of Hawaii's Department of Transportation (DOTA). The preparation was in accordance with the National Environmental Policy Act of 1969 and Hawaii Revised Statutes Chapter 343, for the proposed development.

Copies of the Draft EIS are available for public inspection at the Airports District Office of the FAA, Room 7116, 300 Ala Moana Blvd., Honolulu 96813; the administrative office of DOTA, Suite 700, 400 Rodgers Blvd., Honolulu 96819; the office of the Airports District Manger, Kahului Airport; and at state public libraries.

Written comments should be submitted on or before June 22, 1996, to:

Federal Aviation Administration
Honolulu Airports District Office
Attention: David J. Welhouse
Box 50244
Honolulu, Hawaii 96850

Phone: (808) 541-1243

EXHIBIT V-4. FAA NEWS RELEASE - COMMENT PERIOD EXTENSION

JUNE 8, 1996

Legislative Briefing on the Pearl Harbor Oil Spill

The legislative environmental committee chairs, Representative Jim Shon and Senator Rod Tam, will be holding an informational meeting to review the May 14, 1996 oil spill at Pearl Harbor. The meeting will be held on Monday, June 10, 1996 at 8:30 a.m. in Conference Room 309 at the State Capitol.

On May 14, 1996 at approximately 1:35 a.m., an oil pipeline owned and operated by Chevron Products Company discharged No. 6 Bunker fuel into the East Loch region of Pearl Harbor. Initial estimates of the amount spilled is approximately 600 barrels. The spill impacted various facilities, docks and shoreline areas within the harbor.

At the legislative meeting, presentations will be given by the Department of Health, Chevron, the United States Coast Guard, the United States Navy, and others on the cause of and response to the oil spill. Among the questions to be asked are: (1) what happened and why? (2) how expensive and effective was the cleanup? (3) what are the strengths and weaknesses of our equipment, training, command structure and operations? (4) how much environmental damage was inflicted? and (5) how effective are the regulations governing the maintenance, inspection and replacement of ageing pipelines?

In a related matter, Chevron Products Company is accepting claims for certain uncompensated damages and removal costs caused by the above spill. Damages for which compensation may be received include: damage to natural resources; damage to or loss of real personal property; loss of subsistence use of natural resources; loss of government revenues; loss of profits and earnings capacity; and increased cost of public services. Claimants may call 1-800-286-1397 for more information.

Kahului Airport Improvements Draft EIS Comment Period Extended

In response to requests from the public and policy makers, the Federal Aviation Administration has announced a 30-day extension to the comment period for the Kahului Airport Improvements Draft EIS. The Draft EIS for the Kahului Airport contains 5 volumes of information and some interested parties found the standard 45-day review period too short to complete their review.

The new deadline to submit comments is Saturday, June 22, 1996. Please see the April 8, 1996, Environmental Notice for more information.

Riparian Areas Policies and Recommendations for Hawaii

The Office of State Planning is requesting public input on proposed policies and recommendations regarding land areas around streams called riparian areas.

Riparian areas can function as a natural buffer for the upper watershed, thereby reducing nonpoint source pollution and protecting streams, aquatic resources, and coastal waters. Proposals have been developed for the proposed management practices and implementation strategy for the riparian area.

A copy of the draft document can be obtained by calling the Office of State Planning at 587-2809.

EXHIBIT V-5. OEQC ENVIRONMENTAL NOTICE - COMMENT PERIOD EXTENSION

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WRITTEN COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Esther Ueda, Executive Officer
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Kali Watson, Chairman
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County of Maui

The Honorable Sol P. Kaho'ohalahala, Councilmember
Maui County Council

Henry Oliva, Director
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County of Maui

arles Jencks, Director
Department of Public Works and Waste Management

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Anderson, Jim
Anderson, Larry L.
Aranki, Gina, Director, West Maui Taxpayers Association
Ardoin, Marion and Karen
Asakura, Roland

Bailey, Bren, et al.
Bailey, Gordean, Kumu Hula, Sisters of Hula Halau Wehiwehi of Leilehua
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Balog, Dawn
Bigelow, Charles
Bily, Pat
Blum, Lillian
Boland, Mr. and Mrs. W.
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Bruce, P. J.
Buchanan, Buck

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De Brabandere, B.
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de Naie, Lucienne
Dieguez, Misha
Dieguez, Val
Dixon, Mr. and Mrs. Herbert P.
Downer, Jerry, President, Klahani Resorts Corporation

Edralin, Luisa, et al
Emery, Steven
Enomoto, Margaret
Evanson, Mary M.

Flachsbart, Peter G., Director, Environmental Health Committee, American Lung Association of Hawaii
Fried, Barry

Gardner, Virginia
Gassmann-Duvall, Renate
Grigson, Elizabeth J.

Haase, Liz
Hale, Jim, Controller, Maui Marriot Resort
Hall, Isaac Davis, for the Sierra Club, Mary Evanson, Maui Air Traffic Association, Steven Pitt, James Bendon, the National Audubon Society, Hui Alana o Makena, Dana Naone Hall, and Maui Malama Pono, Inc.
Hamilton, Dwight L.
Hamilton, Lisa
Hasenyager, Donald G.
Hau, Skippy
Hedani, Wayne N., Property Manager, Kapalua Land Company, Ltd.
Hodges, Marc, Wildlife Biologist, PacRim Research
Hondo, Todd, Operations Manager, Kaahumanu Center
Howarth, Francis G., Entomologist, Bishop Museum
Hudgens, Tom
Hughes, Claire K.

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Jackson, Sandra Duarte
Jennings, Karen
Jike, Thomas M.

Kafka, Christine
Kanuha, Hans M.
Kawai, Sheila
Kinnear, Ian F.
Klett, Kathleen
Koestering, Gregory A., Executive Vice President and Managing Director, Grand Wailea Resort
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Kunin, Neal

Labonski, Rosemarie E.
Lafond, Richard Joseph Jr., Executive Director, Maui Tomorrow

Lamerson, Douglas K.
Lee, Ralf
Lennon, Kristen, et. al.
Lessin, Alex and Joan, School of Counseling
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Lindsay, James C.
Lundquist, Mary Ann
Lynch, Terry and Stacy

Madden, Jack
Mahan, Carol
Mann, Mr. and Mrs. Jonathan
Martin, Martha E.
Masters, Joe E.
Mayer, Dick
Meyer, Paul J., Executive Vice President/Finance, Maui Land and Pineapple Company, Inc.
Miguel, Sam
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Mouren, Rita Kay
Mundy, V. Lucile
Muraoka, Gordon Y.

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Nelson, Linda F., President, Native Hawaiian Plant Society
Nishibayashi, William "Bill," Maui Carpenters Union, Local 745

Okura, Leland R.
Olsen, Phillip B.

Paiwa, Crystal G.
Paiwa, Hester
Parker, Jeffery, Tropical Orchid Farm
Parra, Eugene L.
Parton, Cynthia
Pelissero, Godwin J. Jr.
Phelps, Jerry, General Manager, Renaissance, Wailea Beach Resort
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Plummer, Judy
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Reaser, Donald N., Asset Manager, Maui, The Estate of James Campbell
Reinhardt, Edward, Manager, Engineering, Maui Electric Company, Ltd.

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Shepherd, Glenn
Shepherd, Shirley
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Smith, William D.
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Tappeiner, Michael G.
Thompson, Jack, President, Sprekeclsville Community Association
Tummons, Patricia
Towill, Murray E., President, Hawaii Hotel Association

Ueland, Kent, President, Board of Directors, International Colony Club

Vaughn, Ed and Debra
Vencl, Terryl, Executive Director, Maui Hotel Association
Vitarelli, David, Kawelo Construction

Waldow, Florence M.
Walthall, Nicole J., Conservation Law Project, for the National Parks and Conservation Association
Warren, Cole
Westcott, Greg
Westcott, Masako
Woods, Barbara

Yamada, Tim
Yee, Kendrick

ATTACHMENTS TO THE COMMENT LETTERS

The following attachments are referenced in the comment letters and were attached to the individual comment letters, as applicable.

"Air Cargo"
"Bike Route"
"Construction Traffic Impacts"
"Energy"
"Farmland"
"Flora"
"International Flights"
"Mitigation Measures"
"Pipeline"
"Segmentation"
"Solid Waste"

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3.6.4 MITIGATION MEASURES

Given the lack of significant adverse impacts, measures to minimize or mitigate potential adverse impacts are not warranted. In addition, the State Department of Agriculture, is planning to establish a working committee that will address in a comprehensive and systematic manner the overall transportation issue faced by the State's agricultural producers. HDOT-AIR will work with this committee and/or the State Department of Agriculture to plan, design and implement cargo facility improvements that would benefit the shipment of agricultural products, such as covered storage of agricultural produce awaiting shipment, as well as improvements to facilitate the State Department of Agriculture's alien species interception/inspection program.

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Attachment "Bike Route"

Change to Section 3.22.8.6:

Upon consideration of the above mitigation measures, the most reasonable and feasible measure would be to maintain a bike route along Hana Highway, and to provide a crossing at the ramps for the bicyclist. The crossing shall be designed to maintain safety for both motorists and bicyclists and comply with the applicable rules and regulations at the time of design. The location of the crossing should provide for good visibility for both motorist and bicyclist. Adequate signage for both motorist and bicyclist shall be placed to warn both parties of the bike crossing. The intersection of the bike route and the ramps will be coordinated with the appropriate State and County officials during the design to insure that the current bikeway and highway safety standards are met. It is also anticipated that once the Northshore Greenway Bikeway is completed, the bicycle traffic on Hana Highway would be considerably less.

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Attachment "Construction Traffic Impacts"

3.22.8.8 Construction Impacts and Potential Mitigation Measures

The proposed roadway improvements will cause a short-term impact on roadways in the Airport environs, especially on Hana Highway and Dairy Road. It is anticipated that the construction period for the Airport Access Roadway will be approximately 18 months, and includes the realignment of the Hansen Road. Fortunately, most of the work will be remote from the existing roadways and highways, and will not impact roadway traffic.

HDOT is very much aware of the importance of both Hana Highway and Dairy Road to the community and its congestion during peak morning and afternoon hours. It is anticipated that there will be some impacts during the construction of the Airport Access Roadway overpass and during the connections of the new roadway improvements to the existing roads. This period of impact will be several months long with intermittent interruption of traffic along Hana Highway or Dairy Road. The construction work will be designed and scheduled to allow for no lane closures during the peak traffic hours. If necessary, certain operations may be performed during the evening or night hours. To relieve the impact of the realignment of Hansen Road and the closure of Pulehu Road, it is anticipated that the new Hansen Road will be completed prior to the closure of the existing Hansen and Pulehu Roads.

The construction of the Spine Road is not anticipated to cause any significant short-term surface traffic impacts. These construction impacts due to the new roadways are short-term potential impacts and will not cause any significant adverse long-term impacts.

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Attachment "Energy"

Changes to Section 2.2.15 (page 2-17) of the Draft EIS:

Electric Power Distribution System. Kahului Airport receives electric power from Maui Electric Company (MECO) via two 12.47kV, 3-phase lines. According to MECO, the existing 4.16kV, 3-phase line near Kahului Airport may become a possible feeder line to the Airport in the future. Figure 2-21 shows the electrical power distribution system for the Airport. The 12.47kV circuits are fed by MECO's Kanaha Substation located at the intersection of Hana Highway and Dairy Road. The 4.16kV circuit originates from MECO's Paia Substation.

One 12.47kV circuit is routed underground along Keolani Place and feeds the ground transportation subdivision, the air cargo building, the aircraft rescue and fire fighting station, and other facilities in the vicinity of the main passenger terminal. Two 12.47kV underground feeder lines were installed along Keolani Place in conjunction with the construction of the new passenger terminal.

Another overhead 12.47kV circuit runs eastward from the MECO's Dairy Road substation to Haleakala Highway along Hana Highway; at that point it turns westward and follows Haleakala Highway to the helicopter facilities. This feeder serves the helicopter facilities, general aviation facility, cargo facility, air taxi facility, FAA Airport Traffic Control Tower, Airport surveillance radar, and the radio transmitter/receiver building.

Changes to page 2-42 of the Draft EIS:

To accommodate the extension of present Runway 2L-20R and the new parallel runway, portions of the existing 23 kV, 12.47 kV and 69 kV overhead lines along Hana Highway would be placed underground and/or rerouted to be below the runway approach surfaces.

Changes to Section 3.18.1 (pages 3-115 to 3-116) of the Draft EIS:

Kahului Airport is connected to Maui Electric Company's (MECO) electrical power grid. The major sources providing electrical power to this grid are MECO's Kahului and Maalaea power plants, and Hawaiian Commercial and Sugar's power plants. Electrical power at the airport is received via two 12.47 kV, 3-phase distribution lines. The 12.47 kV lines are fed from Kanaha Substation #2. A 4.16 kV line originates from MECO's Paia Substation, and may be a possible feeder line to the airport in the future.

The Kanaha Substation #2, located at the intersection of Hana Highway and Dairy Road, provides most of the electrical power to the airport. This substation has a 7,500 kVA transformer that generally operates at about 50 percent of its rated capacity. Approximately 25 percent of its capacity is used by the Airport. In addition, the Airport has two 2,000 kVA substations installed in the passenger terminal building. These state-owned substations have their own switchgears and transformers.

Based on reviews of the 1994 billing statements, the passenger terminal area uses about 730,000 kilowatt hours (KWH) per month. In 1994, the other Airport areas are estimated to consume about 55,754 KWH per month. According to MECO the present usage of the Airport is about 860,000 KWH per month.

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Attachment "Farmland"

Change to Section 3.3.2 IMPACT ANALYSIS

A&B Hawaii's current plan shows a long-term urbanization of 240 acres of Agricultural land instead of 340 acres.

Change to Section 3.1.7.1 EXISTING CONDITIONS

The irrigation systems for these areas are being or have been converted to be irrigated with Mill water and will reduce the load on the aquifer.

Changes to Section 3.1.7.2 IMPACT ANALYSIS

The proposed Airport Access Road and relocation of the Runway 2-20 navigational and lighting aids will withdraw from production approximately 139 acres of sugar cane cropland by the year 2010. In addition, the Airport Access Roadway will limit the agricultural use of 29 acres of land located south (mauka) of the K-Mart Store on Dairy Road, on the northern side of Hana Highway. Although this acreage remains in ownership with A&B Hawaii, the Airport Access Roadway limits access to this 29 acre parcel, making it unusable for sugar cane cultivation. The total amount of lost farmland will increase to 700 acres if the parallel runway (Runway 2R-20L) is constructed. Until the parallel is needed, this area will remain in agricultural use. A&B Hawaii, Inc., the primary landowner of the sugar cane lands, has indicated that removal of sugar cane lands for airport improvements will not adversely affect its operations. The 700 acres make up about two (2) percent of A&B Hawaii, Inc.'s agricultural lands. The impact of the 168 acres (139+29) will not have a materially adverse impact on A&B Hawaii, Inc. The remaining 550 acres will remain in agriculture and the impact will be assessed in the future, if and when, the land is required for use in connection with the parallel runway. Similarly, A&B Hawaii, Inc. has requested to defer their analysis on the conversion of the agricultural land until a later date, if and when the parallel runway is needed and the conversion occurs.

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3.11.1 TERRESTRIAL FLORA

3.11.1.1 Existing Conditions

Botanical surveys of the Kahului Airport area were conducted in 1981 and 1990. For this EIS, these previous surveys were reviewed and additional surveys were conducted in April and May 1994, and March 1995 (Appendix I). The findings of the recent surveys are summarized below. There are six vegetation zones within the proposed Kahului Airport improvements area: (i) wetlands; (ii) cane field/ruderal borders; (iii) koa haole scrub/mixed understory; (iv) open grassland; (v) kiawe/mixed understory; and (vi) wind-sheared dune vegetation (Figure 3-21).

WETLANDS. Existing conditions information relative to wetlands is provided below in Section 3.12. In general, the wetland vegetative zone within the airport boundaries is relatively small and ephemeral. The wetland areas meet U.S. Army Corps of Engineers definition criteria.

CANE FIELD/RUDERAL BORDERS. Approximately 540 acres of the Kahului Airport area are presently used for sugar cane (*Saccharum officinarum* L.) cultivation. The fields are monotypic; and the margins along the cane fields and haul roads support varied ruderal (weed) species. The yellow flowered Mexican poppy (*Argemone mexicana* L.), *Crassocephalum crepidioides* (Benth.) S. Moore, Natal redtop (*Rhynchelytrum repens* C.E. Hubb), *Chloris barbata* Swartz, and Guinea grass (*Panicum maximum* Jacq.) are found throughout the area or form fringing borders along the cane fields. Also, wild tobacco (*Nicotiana glauca* R.C. Graham), Chinese violets (*Asystasia gangetica* (L.) T. Anders.) and yellow golden crown beard (*Verbesina encelioides* Cav.) are common around the fields. Along Old Stable Road (Spreckelsville Beach Road) the ruderal border varies from one hundred to one hundred thirty feet (thirty to forty meters) across. Here koa haole (*Leucaena leucococephala*) reaches thirty feet (ten meters) in height with a dense understory of elephant grass (*Pennisetum purpureum* Schumach.) and other weedy species.

Along Kala Road and Haleakala Highway, the two paved roads which traverse the cane fields/ruderal borders, trees have been planted for landscape purposes. Along Kala Road, the trees are badly wind sheared and include monkey pod (*Samanea saman* (Jacq.) Merr.), Kassod (*Cassia siamea* Lam.), earpod (*Enterolobium cyclocarpum* (Jacq.) Griseb.), and kiawe (*Prosopis pallida* (Humb. & Bonpl. ex Willd.) Kunth). These trees have reached heights of forty-five to fifty-five feet (fourteen to sixteen meters). An understory of purple bougainvillea vines were planted on the southeastern shoulder of Kala Road; the vines are now ten to sixteen feet (three to five meters) in height. Along Haleakala Highway, near Hana Highway, there are four or five monkeypod trees and one silk oak tree (*Grevillea robusta* A. Cunn), both of which are forty to sixty feet (twelve to eighteen meters) in height and badly wind sheared.

The irrigation ditches which traverse the cane field between Haleakala Highway and northwest of Hana Highway are filled with dense stands of barnyard grass (*Echinochloa crus-galli* (L.) Beauv.), and are fringed with a variety of other grasses and forbs. Along the large unlined drainage ditch within the cane field, it is common to find wild tobacco, neem trees (*Melia azedarach* L.), and koa haole shrubs.

KOA HAOLE SCRUB/MIXED UNDERSTORY. There are several places within the Kahului Airport area where the Koa Haole/Mixed Understory exists (Figure 3-21). Along the

southern edge of the site, between Kala Road and the airport perimeter fence, the koa haole has been burned. Regeneration of the burned plants is occurring. The weed community is also thriving. Buffel grass (*Cenchrus ciliaris* L.), Guinea grass, Natal redtop, pitted beard grass (*Bothriochloa pertusa* (L.) A. Camus) and beach wiregrass (*Dactyloctenium Aegyptium*) are the most abundant grasses. Leguminous weeds within the burned area include wild bean (*Macroptilium* spp.), rattle box (*Crotalaria* spp.), begger weed (*Desmodium*), virgate mimosa (*Desmanthus virgatus* Willd.) and burr clover (*Medicago polymorpha* L.). The Hawaiian medicinal plant, 'uhaloa (*Waltheria indica* L.), and other native species including pa'u-o-Hi'iaka (*Jacquemontia ovalifolia*), pohuehue (*Ipomea pes-caprae* (L.) R. Br.) and 'akulikuli (*Portulaca pilosa* L.) also persist in the burned area.

The koa haole at the northeastern end of the airport area, between the Airport and cane fields, is one to two meters high and has an understory of almost solid buffel grass. Between the perimeter fence and Runway 5-23, there is a large undeveloped area consisting of koa haole, a few kiawe and Christmas berry (*Schinus terebinthifolius* Raddi), Indian fleabane (*Pluchea indica*) and the native 'aheahea (*Chenopodium oahuense* (Meyen) Aellen) shrub. The ground layer is mixed grasses and at least two species of alena (*Boerhavia* spp.) and pa'u-o-Hi'iaka.

OPEN GRASSLAND. Open Grassland is defined as an area where more than 40 percent of the vegetation consists of grass species. This condition prevails in several Kahului Airport areas (Figure 3-21). The largest grassland extends from the perimeter fence to Hana Highway. Buffel grass, guinea grass, love grass (*Eragrostis spp.) and various species of chloris are common. Other grassland* areas also exist at the end of Runway 2-20, at the western end of Runway 5-23 and near the control tower. Most of these areas are mowed regularly.

KIAWE/MIXED UNDERSTORY. The Kiawe/Mixed Understory vegetative zone is characterized by kiawe canopy trees and an understory of buffel grass, Indian fleabane, 'aheahea and Chinese violet. Makai (toward the ocean) or north of Alahao Street, the substrate consists of rolling sand dunes and the vegetation cover is more complex. Kiawe remains the primary canopy tree, but others, including ironwoods (*Casuarina equisetifolia* L.), date palm (*Phoenix dactylifera*), hau (*Hibiscus tiliaceus* L.), milo (*Thespesia populnea*), and Chinese banyan (*Ficus microcarpa* L. f.), can also be found. The shrub layer consists of koa haole, Christmas berry, species of *Pluchea* and 'aheahea plants. The ground layer consists of buffel grass, Guinea grass, California grass, Chinese violet and 'akulikuli (*Sesuvium portulacastrum* L.).

The Kiawe/Mixed Understory makai of Aaele Road includes wili wili haole (*Erythrina variegata* (L.) Merr.), castor bean (*Ricinus communis* L.) and wild tobacco. The ground layer consists of several weedy species including wild tomato (*Lycopersicon pimpinellifolium* (Jusl.) Mill.), apple of Peru (*Nicandra physaloides* (L.) Gaertn.), 'aheahea, balsam apple (*Momordica charantia* L.) and alena species.

WIND-SHEARED DUNE VEGETATION. The low sand dunes makai (north) of the beach road, from the Papa'ula Point houses to the southeastern boundary of the Airport, are covered by a dense mantle of wind-sheared vegetation. There are broad patches of naupaka kahakai (*Scaevola serica* Vahl.), tree heliotrope (*Tournefortia argentea* L. fil), Christmas berry, Spanish reed (*Aruda donax*), sea grape (*Coccoloba uvifera*), koa haole, beach vitex (*Vitex* spp.), 'aheahea, hau, beach morning glory, seashore rush (*Sporobolus virginicus*), buffalo grass (*Stenotaphrum secundatum* (l) Kunth), yellow oleander (*Cascabela thevetia* (L.) Lippold) and remnant landscape plantings around former house sites.

Attachment "International Flights"

Changes to Section 8.2.1. EXISTING CONDITIONS:

At present, Kahului Airport is designated by the U.S. Customs Service as a landing rights airport. A landing rights airport is an airport where incoming international flights must obtain prior permission to land and must furnish advance notice of arrival to U.S. Customs. In addition, The International Civil Aviation Organization (ICAO) identifies Kahului Airport as an alternate international airport. Kahului Airport is available for use by private and general aviation international flights, as well as commercial international charter flights.

Maui is a popular destination for international passengers who travel on regularly scheduled air carrier flights to Hawaii. The majority of international visitors are currently inspected in the Federal Inspection Service (FIS) facilities at Honolulu International Airport (HIA). These visitors then board regularly scheduled domestic interisland flights to Maui. A smaller number of international visitors are pre-cleared in their country of origin and fly directly to Maui. Once pre-cleared, international passengers can be processed at the destination airport in the same manner as domestic passengers.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated and awarded pursuant to treaties between the U.S. and foreign governments. In addition, the route may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Under the Open Sky Policy (U.S. International Transport Statement, April 1995) a foreign government could negotiate with the United States Government for an Open Sky Agreement. This agreement would allow a foreign air carrier to request, through the U.S. Department of Commerce, permission to land at specific airport(s) within a U.S. Custom Port, provided that the airport has the infrastructure to accommodate these flights and passenger demand. The U.S. Department of Commerce must also receive assurances from the community surrounding the airport that the community supports the foreign air carrier's entry into the airport. There are no current or foreseeable requests with the U.S. Department of Commerce for air service into Kahului requiring an Open Sky Agreement.

If a treaty exists providing for international service, the routes provided may be granted by the U.S. Department of Transportation pursuant to formal application for any carrier, foreign or domestic, the latter designated by its government to serve a particular airport. Depending on the treaty, the application process to serve a particular market may be fairly routine or costly and complicated. It may be accomplished through a show-cause non-hearing procedures, or it may involve an extensive carrier selection hearing procedure, particularly in the case of multiple applications for a limited designation market providing for only one or a limited number of U.S. carriers.

From time to time, informal contacts or inquires are made by international air carriers concerning potential service to Kahului, Maui. Both U.S. DOT and HDOT-AIR representatives maintain

monitoring of and liaison with industry associations, U.S. and foreign air carriers, and matters of interest to Hawaii, to keep advised with respect to air transport developments of both general and specific concerns.

Current bilateral agreements between the United States and Japan allows Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. This is based on a 1989 Memorandum of Understanding (bilateral agreement) between the governments of Japan and the United States. The bilateral states, that Japan Airlines is permitted to serve Maui on a one-stop basis via any point in the United States that the designated air carrier is authorized to serve (such as Honolulu International Airport), provided that the new points selected for such one-stop service are not receiving single-plane service to Japan by a United States airline. Frequencies to Maui may not exceed seven flights per week. Up to this point, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. However, without the definite commitment from JAL, the actual date for the initiation of one-stop service is speculative at best and may or may not occur prior to 2010. This could be performed on a limited basis without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities within the existing terminal building will need to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the State of Hawaii Department of Transportation and the Federal Aviation Administration. This business decision on the part of JAL is a result of many factors such as, but not limited to the following: (i) general economic conditions; and (ii) marketing scenarios. Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project.

In recent years, Hawaii has seen a dramatic fall-off of international flights because international air carriers such as Singapore Air, Malaysian Air and Cathy Pacific over-fly Hawaii from Asia to the U.S. mainland. These airlines all have bilateral agreements and landing rights to Honolulu, but due to economic and strategic considerations these airlines have chosen to end service to Hawaii. Therefore, it is not possible to fly direct to Hawaii, from long-haul gateway cities in Southeast Asia, due to a perceived lack of regional demand.

Currently, pre-cleared international flights from Canada are landing at Kahului Airport as regularly scheduled flights and are departing directly to Canada (Vancouver) without weight restrictions on the existing runway. These pre-cleared Canadian flights started in 1992 as chartered flights, with regularly scheduled flights beginning in 1996. Other pre-cleared flights from Canada or elsewhere maybe scheduled in the future regardless of whether more facility improvements are made at the Airport. Because these flights are pre-cleared and because Kahului is a publicly owned and financed airport, the Hawaii Department of Transportation (HDOT) cannot discriminate against any aircraft that wishes to use the Airport. Over the years, Kahului Airport has received federal funds which mandates compliance with federal conditions imposed on the use of these funds. As part of the federal aid, HDOT "will comply with all federal laws, regulations, executive orders, policies, guidelines and requirements as they relate to the application, acceptance and use of Federal funds ...." (Part V, Assurances, Airport Sponsors, October 1, 1990).

Attachment "Mitigation Measures"

Changes to Sections 3.11.3.4 and 5.1.6.1

The mitigation measures proposed in the biological assessment and biological opinion were developed in connection with the Proposed Project and are intended to supplement mitigation measures set forth in the Draft EIS. It is recognized in the studies, that the FAA and HDOT-AIR have a limited role in the control or interdiction of alien species. Therefore, the proposed mitigation measures are in support of the Federal and State agencies that have the responsibility for the inspection for alien species at the Airport. The two primary agencies are the HDOA, which is responsible for inspection of alien species on domestic arrivals; and USDA which is responsible for inspection of alien species on international flights.

The conclusion of the "no jeopardy" biological opinion is that the following mitigation measures should be taken at Kahului Airport to reduce the "introduction rate" of any alien species due to the Proposed Project to the extent possible, and to also mitigate the present rate of alien species arriving on overseas flights. As recognized in the biological assessment, these mitigation measures have been developed to intercept the whole spectrum of potential alien pests, as specific alien species that may impact listed and candidate species were not identified. Therefore, these mitigation measures will apply equally toward alien species that may impact native species, native ecosystems, agriculture and humans and will be in effect by the completion of Phase 1 of the Proposed Project.

PRE-ENTRY

- *Pre-entry Traveler Education about Alien Species.* The HDOT-AIR will support the CGAPS in their educational role of informing the traveling public of the dangers of alien species, particularly in promoting an alien species video acceptable for in-flight viewing.

- *Notification of New Routes to Maui.* The HDOT-AIR, as a member of CGAPS, will keep CGAPS informed of any new proposed domestic or international routes to Maui. CGAPS members include the Hawaii Department of Agriculture, the U.S. Department of Agriculture, and the Fish and Wildlife Service.

- *Treatment of Cargo Holds.* The HDOT-AIR, will develop a voluntary program for all airlines serving Kahului Airport using a non-chemical best practical pesticide/pest prevention treatment program for aircraft cargo spaces.

PORT-OF-ENTRY

- *Traveler Education Regarding Alien Species Risks, Quarantine Restrictions, and Penalties.* The HDOT-AIR shall support efforts by CGAPS and others to adequately and effectively inform arriving passengers of the dangers posed by alien species, the nature of quarantine restrictions, and the penalties for violations. Current CGAPS plans are

for this education program to be self-supporting, therefore, funding commitment is not required.

- *Training of Airline and Airport Personnel in Alien Species Recognition and Response.* A voluntary education program will be planned and implemented by HDOT-AIR that will train airport employees, baggage handlers, airline cabin personnel, and others. This program will educate these personnel to recognize and report smuggled animals and plants/fruit, stowaway snakes and insects, and new alien species on airport grounds. HDOT-AIR will coordinate the planning of this program with HDOA, USDA and CGAPS.

- *Arrival Inspection Facilities.* The HDOT-AIR will support HDOA domestic arrival inspection by installing a data link between arrival gates and baggage claim, installing one X-ray machine to test the feasibility of inspecting arriving baggage, installing a paging system at baggage claim, and supplying office space, kennels and inter-terminal golf carts as necessary. HDOT-AIR will furnish the infrastructure and support to adequately meet USDA inspection needs for international arrivals.

- *Additional Agriculture Arrival Inspectors.* The HDOT-AIR will fund one additional inspection dog and three additional agriculture inspector positions, one of which will act as a handler for the dog, bringing the total to eleven inspectors and two dogs. In light of the proposed measures in the project, and with these additional inspectors, HDOA has determined that it will be able to adequately inspect incoming domestic air traffic associated with the project.

- *New Air Cargo Building.* The HDOT-AIR will design and construct a new air cargo building to meet existing and forecast demands, to include an industrial air curtain barrier to prevent escape of any insects during inspection of air cargo containers; offices and facilities for U.S. Customs, USDA and HDOA; lab space, freezer and sterilization/incineration facilities; space for X-ray equipment; and computer equipment and facilities for the HDOA alien species database system.

- *Quality Control Program.* The HDOT-AIR will design and fund, on an ongoing basis, a comprehensive program to monitor the efficacy of the alien species interdiction system at Kahului Airport. The program shall be designed in consultation with HDOA, USDA, and CGAPS, and shall be developed and operated by a consultant or agent under the control and management of HDOT-AIR. The program will provide yearly reports to all concerned agencies. These reports shall include summaries of all alien species interceptions from all airport-based operations, their origin and mode of arrival, to the extent possible, and estimates of the efficiency of the inspection system for various taxonomic groups of concern. HDOA will take the lead in developing these estimates which should be based in part on tests of the system (*e.g.*, attempted smuggling, random sampling of passenger effects and cargo, complete inspections of aircraft). The

yearly reports shall also include recommendations to improve efficiency of the inspection system and the quality control program itself. The program will be integrated with the existing USDA Quality Control system for international arrivals.

EARLY DETECTION/RESPONSE AND OTHER MEASURES

- *Security Committee:* The HDOT-AIR will encourage the Kahului Airport Security Committee to include alien species control as an element under its purview

- Brown Tree Snake: The HDOT-AIR will review the Brown Tree Snake Control Plan (Aquatic Nuisance Species Task Force 1996) to determine its applicability to all airports within the State.

- *Alien Arthropod Detection and Response:* The HDOT-AIR will, on an ongoing basis, contract with a consultant in entomological pest identification to assist Animal Damage Control in conducting semi-annual monitoring of the airport environs to detect early establishment of new alien insects, particularly social hymenoptera (ants and wasps) and biting diptera (midges, flies and mosquitoes). Results will be communicated to the HDOA and the Quality Control Program. HDOT-AIR will assist HDOA and USDA with manpower, resources and funds in the eradication of any detected population within the Kahului Airport boundary.

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Attachment "Pipeline"

Change to Section 3.8.2:

Due to the long-term nature and uncertainty of this project, beyond the year 2016, this EIS discusses, to the extent possible and reasonable, the potential significant impacts of the fuel pipeline from Kahului Harbor to the Airport Storage Tanks. Prior to the construction of this project additional environmental analyses will be completed in order to determine what, if any, further environmental documentation is required. The environmental analysis will include assessing prudent and feasible alternatives to minimize the pipeline's effects on Kanaha Pond. One of those alternatives includes considering locations further from Kanaha Pond to avoid *constructive use* of Kanaha Pond that could result if the pipeline breaks, or leaks. If alternative locations are not prudent or feasible, mitigation measures, as discussed above, could be implemented to minimize impacts to Kanaha Pond that would result if the pipeline breaks, or leaks.

Change to Section 3.9.2:

Prior to constructing the pipeline from Kahului Harbor to the Airport Bulk Fuel Storage Facility, additional environmental analysis will be completed. The environmental analysis will include assessing prudent and feasible alternatives to minimize the pipeline's effects on Kanaha Pond. One of those alternatives includes considering locations further from Kanaha Pond to avoid *constructive use* of Kanaha Pond that could result if the pipeline breaks, or leaks. If alternative locations are not prudent or feasible, mitigation measures, as discussed in Section 3.8.2, could be implemented to minimize impacts to Kanaha Pond.

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Attachment "Segmentation"

Changes to Section 1.5.1:

Those facilities which are proposed to be constructed in Phase 3 (2009-2016) -- namely the parallel runway, long-term relocation of the helicopters, fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks (beyond 2016), and the transient aircraft apron -- are considered in this EIS, to the extent reasonable and practical. Due to the long range need of these Phase 3 projects, a comprehensive determination of all of the impact's significance may not be possible at this time. Initially, these Phase 3 projects were anticipated to be built ten to twenty years in the future, but they have been pushed further into the future (15 years or more) with the new aviation demand forecasts (See Section 1.8.3). Specifically, the Phase 3 projects, including the transient apron will be constructed, if at all, after 2009. It is anticipated that the parallel runway, long-term relocation of the helicopters, and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks will be constructed, if at all, after 2016. Also, it is recognized that the Master Plan will be implemented over a 20 year or longer period, and that environmental conditions may change during this period. Therefore, it is very likely that this EIS prepared in 1997, will be considered out-of-date in 2009 or beyond.

Thus, the implementation of the specific elements of Phase 3 will necessitate the preparation of a supplemental or new environmental document at that time. If and when the time approaches that these long range projects are required to prevent deterioration of service at Kahului Airport, the Federal Aviation Administration (FAA) may be required to prepare additional environmental documentation pursuant to applicable federal law to address the environmental effects. Likewise, the State of Hawaii, pursuant to HRS Chapter 343, may need to prepare additional environmental documents for the long-term, Phase 3 projects. These additional documents may be either supplemental to this EIS or independent studies[1]. By preparing these documents closer to the time when these facilities may actually be constructed, the environmental analysis will necessarily be more accurate and relevant. At that time, additional environmental analysis will be performed and the appropriate environmental documents will be completed. However, if specific elements of Phase 3 such as the parallel runway, fuel pipeline from Kahului Harbor to the Bulk Fuel Storage Facility, and the permanent International Facility are to be constructed, independent or supplemental EIS(s) will be completed.

This EIS analyzes, to the extent reasonable and practicable, the impacts and their significance of all the phases of the Proposed Project both independently and cumulatively. The different phases of the Proposed Project, Phases 1, 2 and 3 have substantial independent utility from each other. In addition, the implementation of one Phase of the Proposed Project does not foreclose the opportunity to consider alternatives for the other Phases or for the long-term projects, and do not irretrievably commit Federal or State funds to the those other Phases or the long-term projects.

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[1] According to Council on Environmental Quality (CEQ) regulation 1508.28(b), tiering should be used to, "help the lead agency focus on issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe" [emphasis added]. Therefore, the EIS focuses on the short-term (Phase 1) and medium term (Phase 2) projects. An environmental analysis of the Phase 3 projects would provide a more accurate and reliable assessment of the impacts of the Phase 3 projects.

Even if the long-term (Phase 3) projects are never implemented, the Phase 1 and Phase 2 projects would still be necessary and would still serve their intended purposes. As the Phase 3 projects are anticipated fifteen years or more into the future or may never be built, the Phase 1 and 2 projects were planned to possess their own self-contained utility. In addition, the implementation of the Phase 1 and Phase 2 projects in no way prevents the consideration of alternatives to the Phase 3 projects, or does not commit Federal or State funds for the implementation of the Phase 3 projects.

Change to Section 3.20.1.1 Existing Solid Waste Disposal

The *1989 County of Maui Comprehensive Solid Waste Management Plan* indicated that about 55 percent of the total rubbish entering the landfill is generated from Wailuku, Kahului, Waiehu, Paia, Waikapu and Puunene. The remainder of the rubbish is generated in South Maui, West Maui areas other than Wailuku and Kahului, and Upcountry Maui. Maui County has completed two new studies in 1994 for solid waste disposal, these studies are the: (i) "*County of Maui Integrated Solid Waste Management Plan*," and (ii) the "*Solid Waste Characterization Study - Maui, Hawaii*." The 1994 Management Plan study was developed to provide the decision makers in Maui County with a set of goals and policies for implementing and evaluating future solid waste management efforts. This plan was developed in accordance with the Hawaii Integrated Solid Waste Management Act (No. 324-91), which requires each county to prepare an integrated solid waste management plan. This Plan is an update to the 1989 County of Maui Comprehensive Solid Waste Management Plan. The 1994 characterization study was prepared to: (i) quantify the total solid waste being generated on Maui, in the forms of disposed waste and diverted materials; (ii) provide solid waste composition data by generator type and by geographic area for solid waste being disposed at the Central Maui Landfill; and (iii) summarize the composition and quantity data obtained in the study to allow the County to measure its progress to date, generator by generator, and material by material, in meeting its solid waste reduction objectives.

The Central Maui Landfill was designed to serve as the island's primary landfill, thus allowing the closure of other landfills that have exceeded their capacity. The landfill accepts commercial, industrial and residential waste but does not accept hazardous materials. At present, the Maui landfills are accepting asbestos containing materials (ACM) and lead containing paints (LCP) on construction debris with the proper documentation. A 1988 county survey indicated that the waste stream flow was greater than anticipated and that the landfill is rapidly reaching its design capacity. Currently, Maui County is studying methods of increasing the landfill's capacity to meet forecast demand up to the year 2016. The 1994 Management Plan states that the capacity of the planned Phase III of the Central Maui Landfill is unknown, but has a limited future. It recommends the County to proceed with Phase III expansion of the Central Maui Landfill and to begin the new process of siting/constructing a new landfill on the island of Maui. Waste oils, contaminated soils and hazardous materials are currently sent off island for disposal per U.S. EPA and State Department of Health requirements. Hazardous materials are sent to an out-of-state disposal site.

Based on the County's 1988 waste stream flow quantity and composition survey, it was determined that approximately 349 tons per day (tpd) of waste is generated in Central Maui. Of this, it is estimated that airport operations, including car rental agencies, account for approximately 3.5 tpd or approximately one (1) percent of the total Central Maui waste stream. The 1994 characterization study estimated that the total disposed solid waste at the Central Maui Landfill was about 419 tons/day, with approximately 45 percent from the central area. However, the 1994 management plan report used the 1992 solid waste disposal figure of 700 tons/day.

The Kahului Airport started a recycling program for glass and paper/cardboard products for airport users, tenants and airlines. However, due to a lack of volume the recycling of glass products was discontinued. The recycling of the paper/cardboard continues, with pickup by private organizations for recycling. The green waste is hauled separately to the City and County Green Waste facility for recycling.

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FEDERAL AGENCY COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

MAY 2 3 1996

Howard S. Yoshioka, Manager
Airports District Office
Federal Aviation Administration
300 Ala Moana Blvd, Rm 7116
Honolulu HI 96813

Dear Mr. Yoshioka:

The US Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for KAHULUI AIRPORT, PROPOSED AIRPORT MASTER PLAN IMPROVEMENTS, Kahului, Island of Maui, Hawaii. The DEIS was prepared by the Federal Aviation Administration (FAA) and the Hawaii Department of Transportation (HDOT) in cooperation with the Federal Highway Administration (FHWA). Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508). EPA provided comments on the project's Notice of Intent in June 1994.

FAA, as the lead Federal Agency, proposes to improve facilities at Kahului Airport through a series of discrete projects which are evaluated in the DEIS. These projects include acquiring land; constructing a new airport access roadway; constructing new commercial and general aviation facilities and an interim helicopter facility; extending and strengthening runway 2-20; and constructing parallel runway 2R-20L. The DEIS's preferred alternative (proposed project) is derived from the 1993 Kahului Airport Master Plan, which considered six development concepts for the airport. In addition to the six alternatives assessed in the 1993 Master Plan, the DEIS analyzes the impacts of other alternatives and design configurations, including No Action; a 9,600-foot parallel runway; a Declared Distances alternative; alternate runway construction phasing; intersection/interchange configurations for the new airport access road; and relocation of helicopters and general aviation to an off-site location.

Based on our review, we have assigned a rating of EC-2, Environmental Concerns - Insufficient Information. We believe that the DEIS and, more specifically, the preferred alternative, lacks sufficient mitigation to reduce or offset potentially adverse impacts. For example, the DEIS did not present mitigation commitments to reduce or offset impacts to the Iao

aquifer and to minimize impacts associated with generating solid and hazardous wastes. We are seriously concerned that FAA has not used this DEIS as an opportunity to proactively prevent pollution by integrating a full range of pollution prevention features into the project, as recommended in our 1994 scoping letter. The enclosed "Summary of Rating Definitions and Follow-Up Action" explains our rating system more thoroughly. Detailed comments, which explain our environmental concerns, are also enclosed.

We appreciate the opportunity to provide comments on the DEIS and look forward to working with FAA, HDOT and FHWA to strengthen the environmental aspects of the proposed project. If you have any questions, please call me at 415-744-1584 or David Tomsovic of my staff at 415-744-1575.

Sincerely,

David Farrel, Chief
Office of Federal Activities

Enclosures (4):
Summary of Rating Definitions and Follow-Up Action
Detailed Comments
CEQ Pollution Prevention Guidelines
Pollution Prevention Checklists

cc: Dan Harris, FHWA, San Francisco
Owen Miyamoto, HDOT, Honolulu
Brian Choy, OEQC, Honolulu

002162

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

MAY 23 1996

US EPA Comments on (Draft Environmental Impact Statement) DEIS for Kahului Airport, Proposed Master Plan Improvements, Kahului, Maui, Hawaii.

ISSUE: Although demand for water from the Iao aquifer is projected to exceed its estimated yield by the year 2010, the DEIS does not contain a specific commitment to implement water conservation measures. See Comment EPA-1

DISCUSSION: The Federal Aviation Administration (FAA) clearly recognizes that a water shortage is expected in the near future, but the DEIS argues that such a shortage is a "function of the projected increase in growth," and that such a strain on Maui's water supplies would occur with or without the proposed project. Relying on the logic that projected growth through 2010 will place a strain on the aquifer in any event, the DEIS asserts that "no mitigation measures...are necessary" for water conservation. On the other hand, the DEIS acknowledges that the airport consumes slightly more than one percent of the aquifer's sustainable yield, a percentage expected to remain roughly the same over the next 20 years.

It thus appears safe to conclude that the airport will continue to have an impact on the aquifer. The seriousness of the projected water shortage has prompted the County to initiate development of other sources of water in East Maui. Similarly, the DEIS indicates that the Hawaii Department of Transportation (HDOT) is "studying measures" to reduce the amount of potable water consumption at the airport, including surveying and repairing older water lines, use of non-potable water for landscape irrigation, use of drought-resistant plants and recycling rental car washwater.

RECOMMENDATION: Although the water conservation elements under study are commendable, we believe that additional measures by FAA, HDOT, and the Federal Highway Administration (FHWA) are very important. We strongly encourage FAA, HDOT and FHWA to use this project as an opportunity to be environmentally proactive by developing a comprehensive, stringent water conservation program to mitigate the potentially significant impacts of the airport's continuing use of the Iao aquifer. An important first step is to acknowledge that the airport's use of water will exacerbate impacts to the aquifer, and that implementing water conservation measures would reduce such impacts. Following this acknowledgement, we recommend that FAA, HDOT, and FHWA go beyond only "studying measures" and provide firm, specific commitments in the Final Environmental Impact Statement (FEIS) and subsequently in the Record of Decision (ROD) to adopt comprehensive, stringent conservation measures to help reduce the airport's impact on this diminishing water resource.

ISSUE: The DEIS does not contain a waste minimization program for the hazardous and toxic wastes generated at the airport. See Comment EPA-2

DISCUSSION: Our 1994 scoping comments requested FAA to implement hazardous waste minimization as part of the project. There is no mention of hazardous waste minimization anywhere in the five volumes of environmental documentation for the project. According to the DEIS, hazardous and toxic wastes would continue to be generated at the airport regardless of whether the proposed project moves ahead, and that "...future quantities will be similar to those currently produced." While the DEIS (Volume III, Appendix K) contains information showing that there have been problems in managing the airport's hazardous/toxic wastes (by airport tenants), the DEIS maintains that "compliance with applicable rules and regulations" is all that is required to "mitigate" for the airport's solid and hazardous wastes and waste washwater (Volume I, Table 1-3).

While a commitment to comply with applicable rules and regulations is commendable, such mandatory compliance, in and of itself, does not constitute mitigation. For example, in addressing the issue of mitigation, the Council on Environmental Quality (CEQ) states that "(m)itigation measures must be considered even for impacts that by themselves would not be considered 'significant.'" CEQ also notes that "Because the EIS is the most comprehensive environmental document, it is an ideal vehicle in which to lay out not only the full range of...impacts but also the full spectrum of appropriate mitigation." (CEQ, 1981, Questions and Answers About the NEPA Regulations, Question & Answer 19). A comprehensive definition of mitigation can be found in 40 CFR 1508.20.

RECOMMENDATION: Within the framework of 40 CFR 1508.20, and in keeping with CEQ's Pollution Prevention Guidelines (enclosed), we recommend that FAA, HDOT, and FHWA firmly commit to implement a comprehensive hazardous waste minimization program for the project while ensuring that airport tenants realize the critical importance of complying with the Resource Conservation and Recovery Act (RCRA) and State requirements implementing RCRA in Hawaii. The established hazardous waste minimization program should then be reflected as mitigation in the FEIS (Table 1-3) and provided as a commitment in the ROD.

ISSUE: The solid waste discussion in the DEIS lacks a broad-based recycling aspect and the DEIS fails to commit to implementing such an effort. See Comment EPA-3

DISCUSSION: The DEIS indicates that the proposed project would not exceed the solid waste "significance criteria" and therefore solid waste mitigation measures are not required. While FAA, HDOT, and FHWA state that solid wastes generated by airport operations "should be recycled to the extent economically and operationally possible, provided there are qualified recyclers to accept the materials," there is no commitment to take a leadership role by ensuring that solid waste recycling is a high priority. The position of FAA, HDOT, and FHWA is further diminished by an acknowledgement that global recycling markets

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are "severely depressed," which adversely effects recycling efforts in Hawaii also. The discussion on solid waste and the issue of meeting a minimum threshold prior to actually requiring mitigation is similar to the discussions on the Iao aquifer and hazardous waste.

RECOMMENDATION: We believe it is very important for Federal agencies to assume a leadership role by ensuring that Federal projects and activities reflect a strong commitment to recycle as many materials as possible. This commitment should be reflected in the FEIS and the ROD. We recommend that the commitment to a recycling program include as many recyclable materials as feasible, including glass, plastics, paper, cardboard, scrap metal, waste oils, and construction rubble.

ISSUE: The DEIS generally lacks a firm commitment to implement pollution prevention measures. See Comment EPA-4

DISCUSSION: Our June 1994 scoping comments referenced the need for the DEIS to contain a wide variety of pollution prevention measures, specifically suggesting energy and water conservation measures, solid waste recycling, and hazardous waste minimization. In addition to discussing such measures in the DEIS, we asked that FAA provide commitments to implement the measures. In reviewing the DEIS, we find our recommendations were only partially addressed. For example, the DEIS contains a brief discussion of some project features (measures) that could be construed as "pollution prevention," but there is no indication that FAA, HDOT and FHWA will require or implement such measures as a condition of project approval. CEQ, in its 1993 Pollution Prevention Guidelines, encourages Federal agencies to integrate pollution prevention in NEPA planning and decisions. Specifically, CEQ states that "...any reasonable mechanism which successfully avoids, prevents, or reduces pollutant discharges or emissions other than by the traditional method...should...be considered pollution prevention."

RECOMMENDATION: We encourage FAA, HDOT and FHWA to review the enclosed CEQ Pollution Prevention Guidelines and Environmental Impact Reduction Checklists and apply as many aspects of them to the proposed project as possible. We suggest that you use the enclosures to serve as a basis for establishing a pollution prevention program for the proposed developments and to assist in managing the airport in an environmentally sound manner. Similarly, we believe that the proposed project could be considerably strengthened by including, in the FEIS and the ROD, firm commitments to implement pollution prevention measures to the maximum extent possible.

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GENERAL & EDITORIAL COMMENTS

1. We are concerned that the DEIS far exceeds the page limits envisioned by CEQ for EISs. CEQ states that Final EISs "shall normally be less than 150 pages" while "proposals of unusual scope or complexity shall normally be less than 300 pages." (40 CFR 1502.7). Although the project is controversial at the State and local level, we do not consider it to be one of "unusual scope or complexity" warranting a deviation from the normal page limit requirements. We also note that Volume I is not a "stand alone document," rather each volume contains information not replicated in Volume I. We encourage FAA to avoid preparing excessively lengthy documents and, if possible, to substantially reduce the size of the FEIS, in accord with 40 CFR 1502.7. See Comment EPA-5

2. Volume I (p. 4-12) refers to the existing use of "some cesspools" at some areas of the airport, used for wastewater collection, treatment and disposal. We would welcome a brief discussion in the FEIS on the cesspools (number, size, location, whether or not lined, what is discharged to them, monitoring) and whether FAA has considered if they may constitute a "solid waste management facility" under RCRA. See Comment EPA-6

3. Volume III (Appendix K, p. 9) discusses polychlorinated biphenyls (PCBs) at the airport. It mentions that two barrels with PCB wastes are at FAA's approach radar site and that the barrels are "corroded." We appreciate that this information is reported but are concerned that a rupture or leak of the drums may cause a discharge of PCBs into the environment. We encourage FAA and/or HDOT to examine this situation and determine whether the PCB wastes should be transferred to more secure containers. See Comment EPA-7

4. Volume I (p. 3-9) indicates that single-family dwellings in the Puunene area "are scheduled for demolition in the short-term." The FEIS should clarify what project is the trigger for such demolitions and the responsible party (government agency or private developer). See Comment EPA-8

7350-01-J19-2028

Beverly L. Milkman,

Executive Director.

[FR Doc. 93-2187 Filed 1-28-93; 8:45 am]

BILLING CODE 8636-33-M

COUNCIL ON ENVIRONMENTAL QUALITY

National Environmental Policy Act; Pollution Prevention

AGENCY: Council on Environmental Quality, Executive Office of the President.

ACTION: Information only—memorandum to head of Federal departments and agencies regarding pollution prevention and the National Environmental Policy Act.

SUMMARY: This memorandum provides guidance to the federal agencies on incorporating pollution prevention principles, techniques, and mechanisms into their planning and decisionmaking processes and evaluating and reporting those efforts in documents prepared pursuant to the National Environmental Policy Act.

FOR FURTHER INFORMATION CONTACT: Lucinda Low Swartz, Deputy General Counsel, Council on Environmental Quality, 722 Jackson Place NW., Washington, DC 20503. Telephone: 202/395-5754.

SUPPLEMENTARY INFORMATION:

Memorandum

To: Heads of Federal Departments and Agencies

From: Michael R. Deland

Subject: Pollution Prevention and the National Environmental Policy Act

Date: January 12, 1993

Introduction

Although substantial improvements in environmental quality have been made in the last 20 years by focusing federal energies and federal dollars on pollution abatement and on cleaning up pollution once it has occurred, achieving similar improvements in the future will require that polluters and regulators focus more on their efforts on pollution prevention. For example, reducing non-point source pollution—such as runoff from agricultural lands and urban roadways—and addressing cross-media environmental problems—such as the solid waste disposal problem posed by the sludge created in the abatement of air and water pollution—may not be possible with "end-of-the-pipe" solutions.

Pollution prevention techniques seek to reduce the amount and/or toxicity of pollutants being generated. In addition, such techniques promote increased efficiency in the use of raw materials and in conversation of natural resources and can be a most cost-effective means of controlling pollution than does direct regulation. Many strategies have been developed and used to reduce pollution and protect resources, including using fewer toxic inputs, redesigning products, altering manufacturing and maintenance processes, and conserving energy.[1]

This memorandum seeks to encourage all federal departments and agencies, in furtherance of their responsibilities under the National Environmental Policy Act (NEPA), to incorporate pollution prevention principles, techniques, and mechanisms into their planning and decisionmaking processes and to evaluate and report those efforts, as appropriate, in documents prepared pursuant to NEPA.

Background

NEPA provides a longstanding umbrella for a renewed emphasis on pollution prevention in all federal activities. Indeed, NEPA's very purpose is "to promote efforts which will prevent or eliminate damage to the environment * * *." 42 U.S.C. 4321.

Section 101 of NEPA contains Congress' express recognition of "the profound impact of man's activity on the interrelations of all components of the natural environment" and declaration of the policy of the federal government "to use all practicable means and measures * * * to create and maintain conditions under which man and nature can exist in productive harmony * * *." 42 U.S.C. 4331(a). In order to carry out this environmental policy, Congress required all agencies of the federal government to act to preserve, protect, and enhance the environment. See 42 U.S.C. 4331(b).

Further, section 102 of NEPA requires the federal agencies to document the consideration of environmental values in their decisionmaking in "detailed statements" known as environmental impact statements (EIS). 42 U.S.C. 4332(2)(c)). As the United States Supreme Court has noted, the "sweeping policy goals announced in section 101 of NEPA are thus realized through a set of 'action-forcing' procedures that require that agencies take a 'hard look' at environmental consequences." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989).

The very premise of NEPA's policy goals, and the thrust for implementation of those goals in the federal government through the EIS process, is to avoid, minimize, or compensate for adverse environmental impacts before an action is taken. Virtually the entire structure of NEPA compliance has been designed by CEQ with the goal of preventing, eliminating, or minimizing environmental degradation. Thus, compliance with the goals and procedural requirements of NEPA, thoughtfully and fully implemented, can contribute to the reduction of pollution from federal projects, and from projects funded, licensed, or approved by federal agencies.

Defining Pollution Prevention

CEQ defines and uses the term "pollution prevention" broadly. In keeping with NEPA and the CEQ regulations implementing the procedural provisions of the statute, CEQ is not seeking to limit agency discretion in choosing a particular course of action, but rather is providing direction on the incorporation of pollution prevention considerations into agency planning and decisionmaking.

"Pollution prevention" as used in this guidance includes, and is not limited to, reducing or eliminating hazardous or other polluting inputs, which can contribute to both point and non-point source pollution; modifying manufacturing, maintenance, or other industrial practices; modifying product designs; recycling (especially in-process, closed loop recycling); preventing the disposal and transfer of pollution from one media to another; and increasing energy efficiency and conservation. Pollution prevention can be implemented at any stage—input, use or generation, and treatment—and may involve any technique—process modification, waste stream segregation, inventory control, good housekeeping or best management practices, employee training, recycling, and substitution. Indeed, any reasonable mechanism which successfully avoids, prevents, or reduces pollutant discharges or emissions other than by the traditional method of treating pollution at the discharge end of a pipe or a stack should, for purposes of this guidance, be considered pollution prevention.[2]

[1] For a discussion of such strategies and activities, see the Council on Environmental Quality's 20th *Environmental Quality* report, at 213-237 (1989); 21st *Environmental Quality* report, at 79-133 (1990); and 22nd *Environmental Quality* report, at 131-134 (1991).

[2] It should be noted that EPA, in accordance with the Pollution Prevention Act of 1990 (Pub. L. 101-508, 6601 *et seq.*), uses a different definition, one which describes pollution prevention in terms of source reduction and other practices which reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials.

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Federal Agency Responsibilities

Pursuant to the policy goals found in NEPA section 101 and the procedural requirements found in NEPA section 102 and in the CEQ regulations, the federal departments and agencies should take every opportunity to include pollution prevention considerations in the early planning and deci ·making processes for their acti· nd, where appropriate, should document those considerations in any EISs or environmental assessments (EA) prepared for those actions.[3] In this context, federal actions encompass policies and projects initiated by a federal agency itself, as well as activities initiated by a non-federal entity which need federal funding or approval. Federal agencies are encouraged to consult EPA's Pollution Prevention In' ·mation Clearinghouse which can serve as a source of innovative ideas for reducing pollution.

1. Federal Policies, Projects, and Procurements

The federal government develops and implements a wide variety of policies, legislation, rules, and regulations; designs, constructs, and operates its own facilities; owns and manages millions of acres of public lands; and has a substantial role as a purchaser and consumer of commercial goods and services—all of these activities provide tremendous opportunities for pollution prevention which the federal agencies should grasp to the fullest extent practicable. Indeed, some agencies have a already begun their own creative pollution prevention initiatives:

Land Management

The United States Forest Service has instituted best management practices on several national forests. These practices include leaving slash and downed logs in harvest units, maintaining wide buffer zones around streams, and encouraging biological diversity by mimicking historic burn patterns and other natural processes in timber sale design and layout. The beneficial effects have been a reduction in erosion, creation of fish and wildlife habitat, and the elimination of the need to burn debris after logging—in other words, a reduction of air and water pollution.

The National Park Service and the Bureau of Reclamation have implemented integrated pest management programs which minimize or eliminate the use of pesticides. In addition, in some parks storm water runoffs from parking lots have been eliminated by replacing asphalt with the use of a "geo-block" system (interlocking concrete blocks with openings for grass plantings). The lot is mowed as a lawn but has the structural strength to support vehicles.

The Tennessee Valley Authority (TVA) has developed a transmission line right-of-way maintenance program which requires buffer zones around sensitive areas for herbicide applications and use of herbicides which have soil retention properties which allow less frequent treatment and better control. TVA is also testing whole tree chipping to clear rights-of-way in a single pass application, allowing for construction vehicle access but reducing the need for access roads with the nonpoint source pollution associated with leveling, drainage, or compaction. In addition, TVA is using more steel transmission line poles to replace traditional wooden poles which have been treated with chemicals.

For construction projects it undertakes, the Department of Veterans Affairs discusses in NEPA documents and implements pollution prevention measures such as oil separation in storm water drainage of parking structures, soil erosion and sedimentation controls, and the use of recycled asphalt.

Office Programs

Many agencies, including the Department of Agriculture's Economic Research Service and Soil Conservation Service, Department of the Army, Department of the Interior, Consumer Product Safety Commission, and Tennessee Valley Authority, have implemented pollution prevention initiatives in their daily office activities. These initiatives embrace recycling programs covering items such as paper products (e.g., white paper, newsprint, cardboard), aluminum, waste oil, batteries, tires, and scrap metal; procurement and use of "environmentally safe" products and products with recycled material content (e.g., batteries, tires, cement mixed with fly ash and recycled oil, plastic picnic tables); purchase and use of alternative-fueled vehicles in agency fleets; and encouragement of carpooling with employee education programs and locator assistance.

In planning the relocation of its headquarters, the Consumer Product Safety Commission (CPSC) is considering only buildings located within walking distance of the subway system as possible sites. By conveniently siting its headquarters facility, CPSC expects to triple the number of employees relying on public transportation for commuting and to substantially increase the number of agency visitors using public transportation for attendance at agency meetings or events.

Waste Reduction

The Department of Energy (DOE) has instituted an aggressive waste minimization program which has produced substantial results. DOE's nuclear facilities have reduced the sizes of radiological control areas in order to reduce low-level radioactive waste. Other facilities have scrap metal segregation programs which reduce solid waste and allow usable material to be sold and recycled. DOE facilities also are replacing solvents and cleaners containing hazardous materials with less or non-toxic materials.

The Department of the Army has a similar waste reduction program and is vigorously pursuing source reduction changes to industrial processes to eliminate toxic chemical usage that ultimately generates hazardous wastes. The Army's program includes material substitution techniques as well as alternative application technologies. For example, in an EIS and subsequent record of decision for proposed actions on Kwajalein Atoll, the Army committed to segregate solvents from waste oils in the Kwajalein power plant which will prevent continual contamination of large quantities of used engine oil with solvents. Oil recycling equipment will also be installed on power plant diesel generators allowing reuse of waste oil.

The Federal Aviation Administration (FAA) has also implemented a waste minimization program designed to eliminate or reduce the amount and toxicity of wastes generated by all National Airspace System facilities. This program includes using chemical life extenders and recycling additives to reduce the quantity and frequency of wastes generated at FAA facilities and providing chlorofluorocarbon (CFC) recycling equipment to each sector in

energy, water, or other resources or the protection of natural resources by conservation. "Source reduction" is defined as any practice which reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal and which reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

[3] Under section 309 of the Clean Air Act (42 U.S.C. 7609), EPA is directed to review and comment on all major federal actions, including construction projects, proposed legislation, and proposed regulations. In addition, the Pollution Prevention Act of 1990 directs EPA to encourage source reduction practices in other federal agencies. EPA is using this authority to identify opportunities for pollution prevention in the federal agencies and to suggest how pollution prevention concepts can be addressed by the agencies in their EISs and incorporated into the wide range of government activities.

the FAA to that CFCs used in industrial chillers, refrigeration equipment, and air conditioning units can be recaptured, recycled, and reused.

Inventory Control

DOS is improving procurement and inventory control of chemicals and control of materials entering radiologically controlled areas. This can minimize or prevent non-radioactive waste from entering a radioactive waste stream, thus reducing the amount of low-level waste needing disposal.

In two laboratories operated by the Consumer Product Safety Commission, pollution prevention is being practiced by limiting quantities of potentially hazardous materials on hand.

The Tennessee Valley Authority's nuclear program has established a chemical traffic control program to control the use of disposal of hazardous materials. As a result of the program, hazardous materials are being replaced by less hazardous alternatives and use of hazardous chemicals and products has been reduced by 66%.

2. Federal Approvals

In addition to initiating their own policies and projects, federal agencies provide funding in the form of loans, contracts, and grants and/or issue licenses, permits, and other approvals for projects initiated by private parties and state and local government agencies. As with their own projects and consistent with their statutory authorities, federal agencies could urge private applicants to include pollution prevention considerations into the siting, design, construction, and operation of privately owned and operated projects. These considerations could then be included in the NEPA documentation prepared for the federally-funded or federally-approved project, and any pollution prevention commitments made by the applicant would be monitored and enforced by the agency. Thus, using their existing regulatory authority, federal agencies can effectively promote pollution prevention throughout the private sector. Below are some existing examples of incorporation of pollution prevention into federal approvals:

The Nuclear Regulatory Commission has required licensees to perform mitigation measures during nuclear power plant construction. These measures include controlling drainage by means of ditches, berms, and sedimentation basins; prompt revegetation to control erosion; and stockpiling and reusing topsoil. Similarly, mitigation measures required during the construction of transmission facilities include the removal of vegetation by cutting and trimming rather than bulldozing and avoiding multiple stream crossings, wet areas, and areas with steep slopes and highly erodible soils. The mitigation conditions in licenses serve to prevent pollution from soil erosion and to minimize waste from construction.

In the implementation of its programs, the Department of Agriculture encourages farmers to follow management practices designed to reduce the environmental impacts of farming. Such practices include using biological pest controls and integrated pest management to reduce the toxicity and application of pesticides, controlling nutrient loadings by installing buffer strips around streams and replacing inorganic fertilizers with animal manures, and reducing soil erosion through modified tillage and irrigation practices. Further, encouraging the construction of structures such as waste storage pits, terraces, irrigation water conveyances or pipelines, and lined or grassed waterways reduces runoff and percolation of chemicals into the groundwater.

The Department of Transportation's Maritime Administration is conducting research on a Shipboard Piloting Expert System. If installed on vessels, this system would provide a navigation and piloting assistance capability which would instantly provide warnings to a ship master or pilot of pending hazards and recommended changes in vessel heading to circumvent the hazard. The system could prevent tanker collisions or groundings which cause catastrophic releases of pollutants.

The Department of the Interior's Minerals Management Service (MMS) prepares EISs which examine the effects of potential Outer Continental Shelf (OCS) oil exploration on the environment and the various mitigation measures that may be needed to minimize such effects. Some pollution prevention measures which are analyzed in these EISs and which have been adopted for specific lease sales include measures designed to minimize the effects of drilling fluids discharge, waste disposal, oil spills, and air emissions. For example, MMS requires OCS operations to use curbs, gutters, drip pans, and drains on drilling platforms and rig decks to collect contaminants such as oil which may be recycled.

Incorporating Pollution Prevention Into NEPA Documents

NEPA and the CEQ regulations establish a mechanism for building environmental considerations into federal decisionmaking. Specifically, the regulations require federal agencies to "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." 40 CFR 1501.2. This mechanism can be used to incorporate pollution prevention in the early planning stages of a proposal.

In addition, prior to preparation of an EIS, the federal agency proposing the action is required to conduct a scoping process during which the public and other federal agencies are able to participate in discussions concerning the scope of issues to be addressed in the EIS. See 40 CFR 1501.7. Including pollution prevention as an issue in the scoping process would encourage those outside the federal agency to provide insights into pollution prevention technologies which might be available for use in connection with the proposal or its possible alternatives.

Pollution prevention should also be an important component of mitigation of the adverse impacts of a federal action. To the extent practicable, pollution prevention considerations should be included in the proposed action and in the reasonable alternatives to the proposal, and should be addressed in the environmental consequences section of the EIS. See 40 CFR 1502.14(f), 1502.16(h), and 1508.20.

Finally, when an agency reaches a decision on an action for which an EIS was completed, a public record of decision must be prepared which provides information on the alternatives considered and the factors weighed in the decisionmaking process. Specifically, the agency must state whether all practicable means to avoid or minimize environmental harm were adopted, and if not, why they were not. A monitoring and enforcement program must be adopted if appropriate for mitigation. See 40 CFR 1505.2(c). These requirements for the record of decision and for monitoring and enforcement could be an effective means to inform the public of the extent to which pollution prevention is included in a decision and to outline how pollution prevention measures will be implemented.

A discussion of pollution prevention may also be appropriate in an EA. While an EA is designed to be a brief discussion of the environmental impacts of a particular proposal, the preparer could also include suitable pollution prevention techniques as a means to lessen any adverse impacts identified.

See 40 CFR 1508.9. Pollution prevention measures which contribute to an agency's finding of no significant impact must be carried out by the agency or made part of a permit or funding determination.

Conclusion

Pollution prevention can provide both environmental and economic benefits, and CEQ encourages federal agencies to consider pollution prevention principles in their planning and decisionmaking processes in accordance with the policy goals of NEPA Section 101 and to include such considerations in documents prepared pursuant to NEPA section 102, as appropriate.[4] In its role as a regulator, a policymaker, a manager of federal lands, a grantor of federal funds, a consumer, and an operator of federal facilities which can create pollution, the federal government is in a position to help lead the nation's efforts to prevent pollution before it is created. The federal agencies should act now to develop and incorporate pollution prevention considerations in the full range of their activities.

David B. Struhs,
Chief of Staff.

[FR Doc. 93-2104 Filed 1-28-93; 8:45 am]

BILLING CODE 3125-01-M

[4] As a guidance document, this memorandum does not impose any new legal requirements on the agencies and does not require any changes to be made in any existing agency environmental regulations.

DEPARTMENT OF DEFENSE

GENERAL SERVICES ADMINISTRATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[OMB Control No. 9000-0058]

Clearance Request for Schedules for Construction Contracts

AGENCIES: Department of Defense (DOD), General Services Administration (GSA), and National Aeronautics and Space Administration (NASA).

ACTION: Notice of request for an extension to an existing OMB clearance (9000-0058).

SUMMARY: Under the provisions of the Paperwork Reduction Act of 1980 (44 U.S.C. 35), the Federal Acquisition Regulation (FAR) Secretariat has submitted to the Office of Management and Budget (OMB) a request to review and approve an extension of a currently approved information collection requirement concerning Schedules for Construction Contracts.

FOR FURTHER INFORMATION CONTACT: Beverly Fayson, Office of Federal Acquisition Policy, GSA, (202) 501-4755.

SUPPLEMENTARY INFORMATION:

A. Purpose

Federal construction contractors may be required to submit schedules, in the form of a progress chart, showing the order in which the contractor proposes to perform the work. Actual progress shall be entered on the chart as directed by the contracting officer. This information is used to monitor progress under a Federal construction contract when other management approaches for ensuring adequate progress are not used.

B. Annual Reporting Burden

The annual reporting burden is estimated as follows: Respondents, 2,500; responses per respondent, 2; total annual responses, 5,200; preparation hours per response, 1; and total response burden hours, 5,200.

OBTAINING COPIES OF PROPOSALS: Requester may obtain copies of OMB applications or justifications from the General Services Administration, FAR Secretariat (VRS), room 4037, Washington, DC 20405, telephone (202) 501-4755. Please cite OMB Control No. 9000-0058, Schedules for Construction Contracts, in all correspondence.

Dated: January 21, 1993.

Beverly Fayson,
FAR Secretariat.

[FR Doc. 93-2148 Filed 1-28-93; 8:45 am]

BILLING CODE 6820-34-M

Department of the Air Force

USAF Scientific Advisory Board; Meeting

The Architecture & Assessment Panel of the USAF Scientific Advisory Board's Committee on Options for Theater Air Defense will meet on 24 February 1993, at Headquarters ACC, Langley AFB, VA from 8 a.m. to 5 p.m.

The purpose of this meeting will be to gather information, receive briefings on issues related to theater air defense. The meeting will be closed to the public in accordance with section 552b(c) of title 5, United States Code, specifically subparagraphs (1) and (4) thereof.

For further information, contact the Scientific Advisory Board Secretariat at (703) 697-4811.

Patsy J. Conner,
Air Force Federal Register, Liaison Officer.

[FR Doc. 93-2199 Filed 1-28-93; 8:45 am]

BILLING CODE 3910-01-M

DEPARTMENT OF EDUCATION

Indian Education National Advisory Council; Meeting

AGENCY: National Advisory Council on Indian Education, Education.

ACTION: Notice of open meeting.

SUMMARY: This notice sets forth the schedule and proposed agenda of a forthcoming meeting of the Executive Committee of the National Advisory Council on Indian Education. This notice also describes the functions of the Council. Notice of this meeting is required under section 10(a)(2) of the Federal Advisory Committee Act.

DATES AND TIMES: February 22-23, 1993, from 8:30 a.m. to 5 p.m. each day.

ADDRESS: The meeting will be held at the Sheraton Inn Tampa, 7401 East Hillsboro Avenue, Tampa, Florida, 33610, 813/626-0999.

FOR FURTHER INFORMATION CONTACT: Robert K. Chiago, Executive Director, National Advisory Council on Indian Education, 330 C Street SW., room 4072, Switzer Building, Washington, DC 20202-7556. Telephone: 202/205-8353.

SUPPLEMENTARY INFORMATION: The National Advisory Council on Indian Education is established under section 5342 of the Indian Education Act of 1988 (25 U.S.C. 2642). The Council is established to, among other things, assist the Secretary of Education in carrying out responsibilities under the Indian Education Act of 1988 (Part C, title V, Pub. L. 100-297) and to advise Congress and the Secretary of Education with regard to federal education programs in which Indian children or adults participate or from which they can benefit.

The meeting is open to the public. The agenda of the Executive Committee of the National Advisory Council on Indian Education includes finalizing recommendations for consideration by the Department of Education and the Congress relative to the reauthorization of the Office of Elementary and Secondary Education (OESE) Act. The current Act is due to expire on October 1, 1993. Additionally the Executive Committee will finalize dates and locations for a series of hearings to be held in conjunction with the

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POLLUTION PREVENTION/ENVIRONMENTAL IMPACT REDUCTION CHECKLIST FOR AIRPORTS

How Can Airports Affect the Environment?

The planning, design, construction, and operation/maintenance of airports can have a variety of impacts on the environment. These impacts include destruction or alteration of wildlife habitats, erosion, sedimentation, soil compaction, noise pollution, chemical pollution resulting from aircraft maintenance and deicing, aircraft emissions, contaminated runway runoff, and the generation of waste construction materials, as well as litter and other debris from administrative and food service operations. The implementation of pollution prevention strategies can help reduce the volume and toxicity of waste generated by an airport, minimize environmental effects, and reduce operating costs.

Also see checklists on Ecosystem Preservation and Protection, Siting, Energy Management, Vehicle Maintenance, Building/Housing Construction, Highways and Bridges, and Water Use.

What Questions Should Be Asked To Ensure That These Effects Are Minimized or Eliminated?

- Have other forms of mass transit been considered as an alternative to constructing a new airport? Expansion/improvement of commuter rail service may, for example, reduce the need for building new airports.

Noise Concerns. Noise pollution from airports can represent a significant negative impact on human and wildlife health and welfare. Concerns related to noise pollution can include noise-induced hearing loss, annoyance, and sleep disturbance. A number of techniques are, however, available to reduce noise pollution associated with airport operations.

- Does the airport construction and operation plan explain noise and noise analysis methodologies? Are single-event and cumulative noise metrics defined and used in the analysis? *
- Are potential noise effects on human health and welfare analyzed? Have the locations of all noise-sensitive areas (e.g., residences, schools, parks, and ecologically sensitive wildlife areas) been identified? *
- Does the airport operation plan include provisions to increase the distance between the source of noise and sensitive areas? Techniques include changing flight corridors and flight altitudes, gate locations, and taxiway and runup pad patterns. *
- Does the airport construction plan include the use of noise barriers (e.g., berms, hush houses) to reduce impacts on the surrounding environment? *
- Does the airport operation plan include provisions to reduce noise pollution by reducing the number of operations that produce noise, reducing the duration of noise-making events, or limiting the operation of noisier aircraft types at the airport?

* Indicates an environmental impact reduction opportunity.

- Does the aircraft operation plan reduce the number of operations or noise making events that occur at night? Techniques include rescheduling night arrivals and departures to daytime, limiting engine maintenance at night, limiting the use of auxiliary and ground power units, providing preferential runway use based on time of day, and limiting nighttime departures and arrivals based on sound level of the aircraft.

Aircraft Maintenance. Wastes generated as a result of aircraft maintenance activities can include organic solvents, oil and grease, tires, and batteries. Some of these wastes can be toxic or otherwise hazardous, and uncontrolled releases can contaminate surface waters, groundwater, and soils.

- Will aircraft maintenance hangars be located to minimize the potential impacts of maintenance activities? *
- Is there a plan for spill reduction and collection in maintenance areas (such as the use of drip pans, secondary containment, and absorbent products)?

  Will spill prevention and control plans for hazardous materials be located in aircraft service hangars?
- Will aircraft maintenance be conducted on an as-needed basis? Performing maintenance on an as-needed basis rather than on a set schedule can help reduce waste generated by unnecessary maintenance and fluid changes.
- Will aircraft maintenance shops use recycled maintenance products when possible? *
- Will the facility collect engine and hydraulic oil for recycling? Segregating and recycling used oil can significantly reduce the quantity of waste generated and managed at an airport. *
- Will the facility reuse or recycle spent antifreeze? Onsite antifreeze recycling units can be a cost-effective alternative to disposing of spent antifreeze for larger operations. *
- Will precautions be taken to segregate oils and other hydraulic fluids from other waste streams (including solvents)? Oils and hydraulic fluids that are not commingled can be recycled into usable products. *
- Will a bulk fluids distribution system be cost effective? These distribution systems allow employees to dispense only as much product as is necessary for a job, and they reduce the potential for spills associated with the use of large, unwieldy containers.
- Will the facility's solvent sink be operated to reduce environmental impacts? Environmentally preferable operating practices include pre-rinsing parts with dirty solvent before using fresh solvent to extend solvent life, removing parts from the sink slowly to reduce solvent dragout, using drip racks to reduce solvent loss, keeping sink lids closed when not in use to minimize evaporation of solvent, not leaving solvent streams running, and cleaning out sludges regularly to maintain fresh solvent.

* Indicates an environmental impact reduction opportunity.

- Will the facility use aqueous or semi-aqueous cleaners as an alternative to solvents when possible? Aqueous and semi-aqueous cleaners already are being used by several major air carriers to reduce solvent use.
- Will tires removed from aircraft or service vehicles be recapped or recycled for use in other applications? *
- Will lead-acid, lithium, and nickel-cadmium batteries be collected and stored for recycling and metals recovery? *
- Will the facility collect and recycle scrap metals generated at shops (e.g., used parts, empty material storage drums)? In some instances, punctured aerosol spray cans and drained oil filter casings may also be recycled as scrap. *
- Will hazardous materials be properly stored and handled? Proper storage and handling can include labeling containers, protecting materials from the elements, maintaining secondary containment, ensuring the compatibility of stored materials to avoid explosion hazards, and following instructions on the product's Material Safety Data Sheets (MSDSs). *
- Will access to hazardous materials be limited? Limiting access to hazardous materials allows for easier tracking of chemical usage and helps reduce unnecessary waste generation.

Aircraft Painting. Wastes associated with aircraft painting operations include unused paints, dirty thinner, and emissions of volatile organic compounds (VOCs) from thinners and solvents. Used spray booth filters are also waste products that may be generated. Proper training of employees and the use of high efficiency equipment can help reduce waste generation.

- Will aircraft painting operations be located and enclosed to minimize the potential impacts of painting activities?
- Will a non-solvent based paint stripping system be used? Media blast systems have proven to be an effective alternative to solvent strippers.
- Will employees be trained to minimize the amount of waste paint generated by mixing only the amount of paint needed?
- Will the facility employ high efficiency painting technologies? When properly used, high volume, low pressure (HVLP) and electrostatic painting systems can reduce the amount of paint needed for a job and reduce the amount of VOCs released to the air.
- Will employees be trained to use as little solvent/thinner as possible to clean up after painting activities?
- Would it be cost effective to install a distillation unit to recover solvents for reuse? *

* Indicates an environmental impact reduction opportunity.

- Will the facility employ a gun cleaning station? Gun cleaning stations capture the thinner/solvent shot through the gun and condense it for reuse instead of venting to the air. In some cases, it may be possible to use water-based gun cleaners as an alternative to solvent thinner.

- Will the paint shop utilize reusable polystyrene booth filters? Traditional paint booth filters often must be handled as hazardous waste because of the presence of wet paint or paint containing lead or chromium. Polystyrene filters can be cleaned with compressed air and reused (with the paint residue captured for disposal). Once it can no longer be used, the cleaned filter can often be disposed of by dissolving it in a waste thinner drum.

Aircraft Washing. Aircraft washing typically involves pressure spraying the aircraft with cleaning agents, brushing surfaces with an alkaline water-based cleaner, and rinsing with hot or cold water. This activity can generate large quantities of wastewater that may be contaminated with oils, grease, dirt, and detergent.

- Will a centralized, stationary washpad area be located to reduce impacts to the surrounding environment?

- Will washwaters be contained to reduce runoff to the surrounding environment? Will an oil/water separator be used? *

- Can water from the aircraft washpad be captured, filtered, and reused in aircraft washing or other activities? *

- Will the facility use the least toxic cleaner/detergent necessary to effectively clean the aircraft?

- Will equipment (such as flow restrictors) be used to control the amount of water used to wash aircraft?

Deicing Activities. The chemicals used in aircraft and runway deicing activities are a glycol/water mixture that can be released to the environment (soils, surface water and groundwater) via stormwater runoff. Deicing chemicals also may be ingested by deer and other wildlife.

- Will deicing operations be located at a centralized, stationary position to allow aircraft to stop over a drain that captures the glycol-based fluids? Mobile deicers typically do not have secondary containment systems and thus can release deicing chemicals into the environment.

- Can deicing chemicals be collected and reused in aircraft deicing or other purposes? Deicing chemicals can be reused in aircraft applications if they meet performance specifications. *

- Would it be cost effective to install a computerized spraying system to apply deicing chemicals? These systems, which are in use today, are more efficient and require less chemicals per square foot.

* Indicates an environmental impact reduction opportunity.

- Does the facility construction plan call for the installation of in-pavement heating elements (e.g., tubing filled with heated liquid or gas and electrical elements) to aid in taxiway deicing? The use of this type of equipment can reduce the quantity of deicing chemicals that need to be applied.

Concession/Food Services. Concession shops and food service operations can generate significant quantities of solid waste, such as corrugated cardboard, paperboard, office paper, newspapers, magazines, wooden pallets, aluminum, plastic, and glass containers, as well as leftover food. The application of pollution prevention techniques to these operations can help reduce the volume of waste that an airport must dispose of, as well as associated waste management costs.

- Will the facility be designed and constructed to facilitate an in-terminal recycling program for such materials as cardboard, beverage containers, and newspapers that will be convenient and easy to follow for both passengers and shop keepers? *

Administrative Offices. Airports, like other administrative offices, can generate large quantities of waste paper and consume large amounts of energy from lighting, heating and cooling systems, and computers.

- Will office paper generated in the airport's administrative offices be collected for recycling? *

- Will the airport administration facilities specify the purchase of recycled content paper and other office products? *

- Will the facility plan call for the purchase of energy efficient computers that shut off when not in use? Executive Order 12845 committed the Federal Government to purchase energy-efficient computers, monitors, and printers to the maximum extent possible.

- Can motion sensors and other energy conservation techniques be used to reduce energy usage?

Other References

Federal Interagency Committee on Noise (FICON). August 1992. "Federal Agency Review of Selected Airport Noise Analysis Issues."

National Research Council (NRC), Assembly of Behavioral and Social Sciences, Committee on Hearing, Bioacoustics, and Biomechanics (CHABA). 1977. "Guidelines for Preparing Environmental Impact Statements on Noise." Report of Working Group 69.

U.S. Department of Transportation, Federal Aviation Administration. 1989. "Final Environmental Impact Statement for Baltimore/Washington International Airport Extension of Runway 15L/33R."

U.S. Department of Transportation, Federal Aviation Administration. February 1991. "Management of Airport Industrial Waste." AC: 150/5320-15.

U.S. EPA. October 1993. "Eliminating CFC-113 and Methyl Chloroform in Aircraft Maintenance Procedures." EPA-430-B-93-006.

* Indicates an environmental impact reduction opportunity.

U.S. EPA, Region VIII. March 1992. "Operational Approach for Developing a Pollution Prevention by Design Project: A Model Developed from the Denver International Airport's Pollution Prevention Project."

POLLUTION PREVENTION/ENVIRONMENTAL IMPACT REDUCTION CHECKLIST FOR VEHICLE MAINTENANCE

How Can Vehicle Maintenance Affect the Environment?

Vehicle maintenance shops can generate a variety of solid and hazardous wastes. Commonly generated wastes include out-of-date supplies, wastewater, oils, petroleum products and greases, solvents (both waste liquids and vapors), paints, and tires, as well as waste metal, cardboard, and paper. Each of these wastes has the potential to negatively affect one or more of the environmental media (i.e., land, water, and air). However, such activities and practices as segregating wastes, using proper inventory control, preventing spills, practicing preventive maintenance, improving process efficiency, and recycling can help minimize these impacts.

What Questions Should Be Asked To Ensure That These Effects Are Minimized or Eliminated?

Procurement Concerns. Purchasing decisions are an important element of pollution prevention. Making environmentally sound purchasing decisions can help reduce the amount of waste generated by a vehicle maintenance shop. In addition, the purchasing of recycled content products helps support markets for materials collected for recycling.

Executive Order 12873, Federal Acquisition, Recycling, and Waste Prevention, directs Federal agencies to increase their purchases of recycled or environmentally preferable (EP) products.

- Will the facility use recycled automotive maintenance products and retread tires? Such products as refiltered or re-refined oil and hydraulic fluids, as well as recycled antifreeze and solvent, are available for use in vehicle maintenance operations.
- Will the facility identify and use the least toxic product available to complete a job? Many automotive maintenance products are formulated with high percentages of volatile organic compounds (VOCs) and toxic constituents. Safer, more environmentally sound materials are, however, available and perform as well as traditional products. For example, non-chlorinated solvents can be substituted for chlorinated solvents, detergent-based solutions can be substituted for caustic solutions in many applications, and water-based cleaners often can be used instead of organic solvents.
- Will long-lasting or synthetic oils be used when possible? Long-lasting oils reduce waste generation because they do not need to be replaced as often.

Hazardous Materials Storage. Vehicle maintenance operations often involve the use of hazardous materials. The use of these materials can affect the environment through improper storage, air emissions of volatile chemicals, and spills and other uncontrolled releases, as well as the potential generation of toxic waste materials.

- Will hazardous materials be properly stored and handled? Proper storage and handling can include labeling containers, protecting materials from the elements, maintaining secondary containment.

ensuring the compatibility of stored materials to avoid explosion hazards, and following instructions on the product's Material Safety Data Sheets (MSDSs). *

- Will the access to hazardous materials be limited? Limiting the access to hazardous materials allows a shop to keep track of chemical usage more easily and helps reduce unnecessary waste generation.

- Will a first-in, first-out inventory control system be used? This type of system helps prevent materials from expiring prior to use and becoming unnecessary waste. Efforts should also be made to minimize inventory levels by purchasing only the amount of material that will be needed in a reasonably short period of time (e.g., 30 days) to reduce loss from spoilage. At the same time, however, materials should be purchased in the largest containers appropriate to minimize excessive packaging.

Operating Practices. The use of oils, solvents, and other vehicle maintenance products can have significant effects on human health and the environment. The adoption of environmentally conscious operating practices can, however, reduce these impacts.

- Will vehicle maintenance bays be located to minimize the potential impacts of maintenance activities on the surrounding environment? *

- Will the facility avoid unnecessary maintenance on vehicles? One of the biggest sources of waste generated from vehicle maintenance shops comes from unneeded maintenance activities. An example of a way to minimize this waste is to change vehicle fluids on an as-needed basis rather than according to a fixed maintenance schedule not based on vehicle usage.

- Does the facility operating plan specify reducing the number and types of products, such as solvent, that will be used at the shop? Minimizing the types of different solvents used can simplify inventory procedures, reduce waste management issues, and facilitate recycling.

- Does the facility keep copies of its spill control and countermeasure plan for hazardous materials in each shop?

- Will the facility use drip pans, secondary containment, and other collection devices to help reduce the impact of spills and the use of absorbent products?

- Will a bulk fluids distribution system be cost effective? This type of system allows employees to dispense only as much product as is necessary for a job, in addition to reducing the potential for spills associated with the use of large, unwieldy containers. *

- Will the facility's solvent sink be operated to reduce environmental impacts? Environmentally preferable operating practices include pre-rinsing parts with dirty solvent before using fresh solvent to extend solvent life, removing parts from the sink slowly to reduce solvent dragout, using drip racks to reduce solvent loss, keeping sink lids closed when not in use to minimize the evaporation of solvent, not leaving solvent streams running, and cleaning out sludges regularly to maintain fresh solvent.

* Indicates an environmental impact reduction opportunity.

Vehicle Washing Activities. Vehicle washing can generate a large quantity of wastewater that may be contaminated with oils, greases, and dirt, as well as washing soaps and detergents. In some States, it is illegal to wash vehicles without wastewater recycling equipment under certain conditions.

- Does vehicle washing need to take place onsite? In some instances, offsite washing is a more efficient and environmentally preferable option. However, if properly implemented, onsite washing can be preferable since it can reduce the amount of fuel used expressly for moving the vehicle for washing.

- Will vehicle washing take place at a centralized, enclosed, and contained area to reduce potential impacts to the surrounding environment from runoff?

- Will vehicle washing be conducted on an as-needed basis, rather than according to a fixed schedule? Reducing unnecessary vehicle washing can significantly reduce wastewater generation.

- Will the wastewater from the wash rack's floor drains be properly treated onsite (e.g., by removing oils, greases, and other contaminants) prior to discharge to a waterbody? Will an oil/water separator be used?

- Will the wash rack use detergents that do not contain phosphates or toxics?

- Can water from the wash rack be captured, filtered, and reused rather than being released? If a facility will maintain a large fleet of vehicles that require washing, a custom designed washing facility may be cost effective. If vehicle washing must be performed by hand, a high volume, low pressure washer system will be more cost effective than a simple hose in terms of reduced personnel hours and energy usage.

Reuse and Recycling. Many of the waste materials generated during vehicle maintenance activities can be reused or recycled into usable products. Reuse and recycling are preferable to treatment and disposal because they remove materials that would otherwise become waste.

- Are there plans for adequate segregation and containment of waste oil, antifreeze, and solvent? Each of these materials can be reclaimed or recycled if segregated. However, commingling these wastes makes recovery more difficult or impossible and dramatically increases waste disposal costs. *

- Will the facility use solvent or antifreeze reclamation units? The onsite recycling of fluids is often a cost-effective pollution prevention option for larger shops. When onsite recycling is not cost effective, these materials can be segregated and picked up by a contractor for offsite recycling. *

- Will the facility collect scrap metals generated at the shop (e.g., used parts, empty material storage drums) for recycling? In some instances, punctured aerosol spray cans and drained oil filter casings may also be recycled as scrap. *

- Will automotive batteries be collected and stored for recycling? *

* Indicates an environmental impact reduction opportunity.

- Will the facility reuse cardboard and other packaging received in the delivery of parts and materials or collect it for recycling? *

- Will tires be collected and stored for recycling? *

Painting Operations. Wastes associated with painting operations include unused paints and dirty thinner. Thinners and solvents can also be sources of VOC emissions. Used spray booth filters are also waste products that may be generated from these shops. Proper training of employees and the use of high efficiency equipment can help reduce waste generation.

- Can water-based coatings be used instead of solvent-based coatings? The automobile industry is working closely with paint manufacturers to develop acceptable substitutes for solvent-based paints.

- Will the facility use high efficiency painting technologies? When properly used, high volume, low pressure (HVLP) and electrostatic painting systems can reduce the amount of paint needed for a job and the amount of VOCs released to the air.

- Will employees be trained to use as little solvent/thinner as possible to clean up after painting activities?

- Will the facility employ a gun cleaning station? Gun cleaning stations capture the thinner/solvent shot through the gun and condense it for reuse instead of venting the substance to the air. In some cases, it may be possible to use water-based gun cleaners as an alternative to solvent thinner. *

- Will the paint shop utilize reusable polystyrene booth filters? Traditional paint booth filters often must be handled as hazardous waste because of the presence of wet paint or paint containing lead or chromium. Polystyrene filters can be cleaned with compressed air and reused (with the paint residue captured for disposal). Once it can no longer be used, the cleaned filter often can be disposed of by dissolving it in a waste thinner drum.

- Will painting operations be located in an enclosed and properly ventilated area to reduce potential environmental releases?

- Will employees be trained to minimize the amount of waste paint generated by mixing only the amount of paint needed for a job?

Pollution Prevention/Environmental Reduction Impact Training. Pollution prevention and environmental impact reduction in vehicle maintenance shops is closely linked with employee attitudes toward their work and the environment. A facility that provides basic environmental awareness/pollution prevention training and enthusiastically supports pollution prevention on a daily basis will have a noticeable effect on worker attitudes and can help reduce vehicle maintenance waste streams through such procedures as good housekeeping, spill prevention, and improved materials handling.

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* Indicates an environmental impact reduction opportunity.

Other References

U.S. Environmental Protection Agency, Office of Research and Development. October 1991. "Guides to Pollution Prevention: The Automotive Refinishing Industry." EPA/625/7-91/016.

U.S. Environmental Protection Agency, Office of Research and Development. October 1991. "Guides to Pollution Prevention: The Automotive Repair Industry." EPA/625/7-91/013.

POLLUTION PREVENTION/ENVIRONMENTAL IMPACT REDUCTION CHECKLIST FOR WATER USE

How Can Water Use Affect the Environment?

The procurement and delivery of water for domestic, commercial, and industrial use, as well as the treatment of wastewater generated by these users, affect the environment. Water procurement can affect the quality and quantity of both surface water and groundwater, cause land subsidence from groundwater overdraft, and destroy habitat. Water delivery systems can destroy habitat and ecosystems from canal and pipeline construction and consume energy for pumping. Wastewater affects surface water quality and habitats and requires energy to treat. The employment of water conservation techniques can reduce the environmental effects of water use.

What Questions Should Be Asked To Ensure That These Effects Are Minimized or Eliminated?

Executive Order 12902, Energy Efficiency and Water Conservation, directs all Federal agencies and facilities to improve their water efficiency. Every Federal facility is required to contribute toward agency water use reduction and conservation goals.

Heating and Cooling. A study by Denver Water, supplier to Denver, Colorado, determined that 48 percent of the water used by manufacturers is used for heating and cooling purposes. A significant amount of water use and wastewater production can be minimized by increasing the efficiency of heating and cooling equipment and by decreasing heating and cooling requirements.

- Will energy conservation measures be employed to reduce the need for heating or cooling?
- Will the most efficient heating and cooling equipment available be used to reduce water needs?
- Can air-cooled equipment be used instead of water-cooled?
- Will heating and cooling equipment be maintained according to manufacturer recommendations and will leaks be repaired in a timely manner? Proper maintenance can help reduce the use of water by this equipment.
- Will once-through cooled water be used? If once-through cooling is used, will the water be reused for irrigation or make-up water? Whenever feasible, once-through cooling should be eliminated from any facility design.

Sanitary and Kitchen Fixtures. Water conserving fixtures can significantly reduce water use in sanitary and kitchen facilities in commercial offices, industrial buildings, and residential dwellings.

- Are ultra-low flush toilets specified for installation?
- Will flow restrictors be installed on faucets and showers?
- Will notices be posted to encourage minimizing shower time and turning the tap off when the water is not needed?
- Will aerators be used on all faucets?
- Will fixtures be routinely inspected for leaks and other problems, and will they be repaired promptly?

Process Water. Manufacturers, food and beverage processors, schools, health care facilities, and laundries use substantial amounts of water in their processes. Reductions can be achieved in the amount of water used by installing water saving devices, implementing new or modified processes, and reusing water.

- Have process modifications that would use less or no water been evaluated for implementation? Have water-less processes been considered?
- Could rates be structured to reduce peak water demand?
- Will automatic valves and water level sensors be employed to turn water off when not in use and to provide the precise amount when needed?
- Will process water be recirculated until it is too dirty for use?
- Will process water be recycled onsite and returned to the process or used to meet other onsite needs (e.g., landscaping)?*

Landscaping. Landscaping plans tailored to the specific nature of the local environment can greatly reduce water use. Appropriate landscaping includes using water conserving plants in hot and dry regions. Landscape irrigation is also a key area where water use can be reduced.

President Clinton recently signed a Presidential Memorandum calling for the establishment of guidelines for Federal facility managers on how to implement water conservation techniques in conjunction with landscaping activities.

- Will vegetation be planted that is drought tolerant and uses low levels of water?
- Depending on the type of landscaping, is the most efficient type of water application specified for use?
- Will daytime watering be prohibited?
- Will automatic timers be employed, and will watering duration be monitored to prevent overwatering?
- Can non-potable, treated wastewater be used for irrigation?*

Other References

Maddaus, W.O. 1989. *Water Conservation*. American Water Works Association.

Water Efficiency: A Resource for Utility Managers, Community Planners, and Other Decisionmakers. 1991. The Water Program, Rocky Mountain Institute.

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*Indicates an environmental impact reduction opportunity.

POLLUTION PREVENTION/ENVIRONMENTAL IMPACT REDUCTION CHECKLIST FOR LANDSCAPING

How Can Landscaping Affect the Environment?

Landscaping wastes currently account for approximately 20 percent (or 31 million tons) of the municipal solid waste (MSW) generated in the United States each year. This makes landscape trimmings the second largest component (by weight) of the MSW stream. Because of their high bulk and density, landscaping wastes consume a disproportionate amount of landfill space. In addition, these wastes, as well as other organic matter disposed of in the landfill, can generate methane and acidic leachate when they decompose. When incinerated, the high moisture content and high nitrogen levels of these wastes can interfere with the combustion process and contribute to the formation of smog-causing nitrogen oxides.

What Questions Should Be Asked To Ensure That These Effects Are Minimized or Eliminated?

On April 26, 1994, President Clinton signed a Presidential Memorandum calling for the establishment of guidelines for Federal facility managers on how to increase the use of native species, reduce the use of chemical fertilizers and pesticides, implement water conservation techniques, and promote awareness of the environmental and economic benefits of better landscaping techniques. These guidelines will be proposed by a Federal interagency workgroup established by the Federal Environmental Executive. The following questions address the concept delineated in the Presidential Memorandum, as well as additional opportunities to prevent pollution and reduce waste generation associated with landscaping operations.

Ecosystem Concerns. Landscaping activities can affect the environment through the release of toxic pesticides and excess nutrients, as well as the destruction of wildlife habitat and ecologically sensitive areas. However, proper landscape design and maintenance can help reduce these environmental impacts and can help minimize the effects of other activities as well.

- Will landscape development be integrated with existing natural resources? Such integration may include the use of a Geographic Information System (GIS) that incorporates physical and natural features of the area to be developed (e.g., tidal and non-tidal wetlands, steep slopes, and natural riparian buffers). *
- Will the landscape plan incorporate the use of plants that require little water and minimal fertilizer, herbicide, and pesticide use?
- Does the landscape plan encourage the use of Integrated Pest Management (IPM)?
- Will the landscape plan ensure that rare, threatened, and endangered wildflowers and other species are adequately protected? *
- Does the landscape plan consider materials other than asphalt for constructing walkways across lawns (i.e., using wood chips, flag stones, and other materials that have less environmental impact than asphalt)?

* Indicates an environmental impact reduction opportunity.

- Will the landscape plan include the planting of primarily native trees, shrubs, and perennials? *
- Will the introduction of invasive species be avoided? *
- Will the plantings be arranged in a natural manner and in naturally associated groupings? *
- Does the landscaping plan incorporate features to minimize solar radiation or heat sinks, such as planting shade trees and avoiding overly large areas of asphalt? *
- Will the plant species used in the landscape plan provide food or cover for desirable wildlife? *
- Will the landscape plan call for fertilizing lawns only when grass roots will take up nutrients? These times are late summer-fall for cool season grasses and early summer for warm season grasses.
- Will lawns be watered at the optimal time of day to promote healthy growth and conserve water?
- Does the landscape plan take advantage of vegetation's natural properties? Planting shade trees near building windows can reduce energy consumption associated with air conditioning needs and serve as effective wind barriers.
- Will species of vegetation that support wetlands development be planted on the edges of waterbodies? These species may help break down pollutants carried in non-point source runoff and also can prevent soil and debris from polluting waterbodies.
- Will lawn areas be kept to a minimum with the remainder planted/retained as native meadows and woodlands to minimize air impacts associated with power maintenance equipment and the need for pesticides?
- Does the facility design reduce the impact of lighting on critical habitats and scenic areas?

Reducing Landscape Wastes. A number of steps can be taken during project planning, design, and operation and maintenance to reduce or avoid the generation of landscaping wastes. These techniques include landscape development and alteration, grass-cycling, composting, and mulching. They can be tailored to specific characteristics of a landscape, such as climate and geography, and can be mixed in any number of combinations.

- Will the landscape plan incorporate the planting of native and indigenous trees and plants that require less attention and maintenance? *
- Will trees and shrubs be pruned only on an as needed basis? *
- Will grass-cycling be practiced as part of project landscape maintenance operations? Grass-cycling is a process in which grass clippings are left in place on a lawn after mowing instead of being raked and bagged. Grass-cycling requires that no more than one third of the blade is cut off and that no more a 1-inch total be cut at any one time. This process improves lawn quality by returning

* Indicates an environmental impact reduction opportunity.

important nutrients from the decaying clippings to the soil and lawn. When grass-cycling is practiced, less money is spent on fertilizers, disposable collection bags, labor costs, and waste disposal.*

- Will composting be practiced as part of project landscaping maintenance operations? Composting is a process using microorganisms (generally bacteria or fungi) in the presence of oxygen and moisture to break down organic wastes into a humus-like product. Compost is a superior soil conditioner or mulch suitable for most landscaping and gardening uses. Using compost will help reduce reliance on phosphate and nitrogen fertilizers that may be detrimental to the surrounding ecosystems. Compostable materials include grass clippings, seaweed, leaves, sawdust, chipped or shredded brush, cow and horse manure, chipped or shredded logs, weeds, pine needles, hay, straw, shredded newspaper, and wool and cotton rags. Weeds with many seeds, diseased plants, and manure from meat-eating animals should not, however, be composted.

- Will mulching be practiced as part of project landscaping maintenance? Mulching is the practice of spreading or mixing organic material, such as wood chips, leaves, or compost, over soil surfaces. Mulch reduces moisture evaporation from the soil surfaces, reduces soil erosion and compaction from heavy rains, moderates soil temperature, provides optimal conditions for soil enhancing organisms, protects young tree trunks, and provides nutrients as it decays. Furthermore, mulch inhibits weed growth, thereby decreasing the need for constant landscaping care and weed disposal.

Landscape Product Purchasing and Management. Lawn and plant care products, such as fertilizers and pesticides, are also considered as wastes that result from landscape operations. Spoilage of these materials and the packaging left after use should be minimized to reduce an operation's impact on the environment.

- Will landscape products be purchased in bulk or concentrate to reduce packaging waste?

- Will strict inventory control practices be adopted to prevent material expiration and, thus, waste generation?

- Will the use of gas-powered landscape maintenance equipment (which account for 5 percent of our air pollution) be kept to a minimum? Executive Order 12844 calls on Federal facilities to increase their purchase of alternatively fueled motor vehicles.

Other References

"Presidential Memorandum for the Heads of Executive Departments and Agencies on Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds." August 22, 1994. *Federal Register* Vol. 59, No. 161.

U.S. EPA. "Environmental Fact Sheet: Recycling Grass Clippings." July 1992. EPA/530-F-92-012.

U.S. EPA. "Environmental Fact Sheet: Yard Waste Composting." May 1991. EPA/530-SW-91-009.

* Indicates an environmental impact reduction opportunity.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1052

August 20, 1997

Mr. David Farrel
Chief
Office of Federal Activities
Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Farrel:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

Comment EPA-1 - Aquifers

The State of Hawaii, being the only island state within the union, is very conscious of the available water supply on each of its island counties. For this reason, the State Department of Land and Natural Resource (DLNR) has the ultimate jurisdiction over all of the State aquifers. The development of the aquifers is performed by the Counties of the State. The County of Maui, Department of Water Supply, is responsible for the development and distribution of Maui's water. The State of Hawaii acts as the qualify control manager for the aquifer. The role of the Hawaii Department of Transportation (HDOT), Airports Division, and the Federal Aviation Administration (FAA) are to plan and implement water conservation measures as necessary.

The HDOT has been a leader in implementing the reuse of non-potable water for irrigation at Honolulu International Airport and on its highway system on Oahu. HDOT, Airports Division, will continue this same philosophy at Kahului Airport.

The HDOT, Airports Division, is planning to implement, as part of the Proposed Project, a non-potable irrigation system for Kahului Airport. In addition, the Proposed Project will upgrade existing older water lines to minimize water leaks. Therefore, HDOT, Airports Division, believes that its measures for water conservation are appropriate and in accordance with the concept of home rule for Maui County. The FAA and HDOT, Airports Division, recognize that the water supply issue is a serious problem and identifies it as a cumulative significant impact and will assist the County of Maui in program for water development and conservation measures, as applicable.

Comment EPA-2 - Hazardous Waste

The HDOT, Airports Division, will follow all applicable rules and regulations for the control of hazardous and toxic waste generated at Kahului Airport. The State of Hawaii plans, operates and maintains all airports in the State of Hawaii through HDOT, Airports Division. The Engineering-Planning Group of the Engineering-Construction Branch of HDOT, Airports Division, is in the process of selecting an environmental consultant to assist the Engineer-Planner Group in developing environmental control programs for all State airports. Part of the environmental programs to be developed are waste minimization program for hazardous and toxic waste for all the State airports. The framework of 40 CFR 1508.20 and CEQ's Pollution Prevention Guidelines will be followed in developing these programs.

Comment EPA-3 - Solid Waste Disposal

HDOT, Airports Division, is responsible for planning, designing, constructing, operating and maintaining the State of Hawaii Airport System. Within the State of Hawaii, the responsibility for solid waste disposal is by the Counties of the State. HDOT, Airports Division, is committed to supporting the Counties in their solid waste recycling programs. The Kahului Airport started a recycling program for glass and paper/cardboard products for airport users, tenants and airlines. However, due to a lack of volume, the recycling of glass products was discontinued. The recycling of the paper/cardboard continues, with pickup by private organizations for recycling. The green waste is hauled separately to the City and County Green Waste facility for recycling. The HDOT, Airports Division, will support the County of Maui in their recycling efforts, as applicable.

Comment EPA-4 - Pollution Prevention

The HDOT, Airports Division, is firmly committed to planning, designing, constructing, operating and maintaining the State Airport System in accordance with all applicable pollution prevention and control standards. The Governor of Hawaii has submitted a letter to this effect and the letter is included in the Final EIS.

Comment EPA-5 - Page Limitation for the Draft EIS

The development of Kahului Airport has been the subject of past litigation which required that the EIS be a combined Federal and State EIS, subject to both Section 102(2)(c) of the National Environmental Policy Act of 1969 and Hawaii Revised Statues, Chapter 343. Additionally, the Court Stipulation required additional analysis to be included in this EIS. The Proposed Project of the EIS is complex and is perceived by many to have far reaching consequences for this reason and those stated above, the EIS is longer then for other similar projects in Hawaii.

Comment EPA-6 - Wastewater Collection, Treatment and Disposal

In Appendix L of the Draft EIS contains a description of the portions of Kahului Airport which are served by cesspools (9), septic tank (1) and seepage pits (2). These facilities are located on Figure S-1 of the Appendix L. The cesspools, septic tank and seepage pits were built in accordance with the County of Maui building codes. Under the Proposed Project the East Ramp Sewerage System will replace the existing facilities in the time period of Year 2003 to 2008. These existing sewerage facilities are not considered a "solid waste management facility" under the Resource Conservation and Recovery Act.

Comment EPA-7 - Polychlorinated Biphenyls

The two barrels of polychlorinated biphenyls have been removed by the FAA from the Approach Radar Site and have been disposed in an approved facility.

Comment EPA-8 - Single Family Dwelling in the Puunene Area

The houses in the Puunene area are old abandon plantation housing for Hawaii Commercial & Sugar Company (HCS), an subsidiary of Alexander & Baldwin, Inc. These houses are in poor shape and

there is no longer a need for them. They are to be demolished by HCS and the area will be rezoned for industrial use and compatible with the airport.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P. O. Box 50004
Honolulu, HI
96850-0001

April 29, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

Subject: Draft Environmental Impact Statement (DEIS) - Kahului Airport Improvement, Kahului, HI

We have reviewed the above-mentioned document and have no comments to offer at this time.

We thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.970

August 20, 1997

Mr. Kenneth M. Kaneshiro
State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850-0001

Dear Mr. Kaneshiro:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your review of the Draft EIS for the proposed Kahului Airport Improvements. As indicated in your letter dated April 29, 1996, we appreciate the fact that you have no comments to offer at this time. Your letter and this response will be appended to the Final EIS.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

April 11, 1996

Attn: Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

Subject: Draft Environmental Impact Statement (DEIS)
Kahului Airport Improvements, Kahului, Maui, Hawaii
Volumes I, II, III, IV, and V

We are in receipt of the subject DEIS. We regret that due to prior commitments, we are unable to review the DEIS by May 23, 1996.

Sincerely,

William Meyer
District Chief

cc: Governor Benjamin J. Cayetano c/o Office of Environmental Quality Control
Mr. Owen Miyamoto, Airports Administrator, Department of Transportation, Airports Division
Mr. Brian T. Ishii, Edward K. Noda and Associates, Inc.
Mr. Jerry M. Matsuda, Deputy Director, Department of Transportation, Airports Division

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
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KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Hinaga

IN REPLY REFER TO
AIR-EN
97.954

August 20, 1997

Mr. William Meyer
District Chief
U.S. Department of the Interior
U.S. Geological Survey
Water Resources Division
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your letter of April 11, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. Your letter and this response will be appended to the Final EIS for review by the decision makers.

The potential effects of the Proposed Project on the water resources of the project area and island of Maui are discussed in Section 3.13 and 3.22.1 of the Draft EIS. Our analyses indicate that there will be no significant impacts to hydrology, floodplain management and drainage due to the Proposed Project. Similarly, the Proposed Project, in itself, is not expected to adversely affect existing or planned potable water systems or supplies.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

April 23, 1996

Planning and Operations Division

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Kahului Airport Project, Maui. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. Based on the information provided, no wetlands are being affected by the proposed improvements. However, a review of the drainage system indicates options which may affect waters of the U.S.; therefore, we would like our agency to be kept informed throughout the review process. File number PO95-027/950010027 has been assigned to this project.

See Comment DOA-1 and DOA-2

b. The flood hazard information provided on page 3 of Appendix 3 and page 8 of Appendix D is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning
and Operations Division

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS:
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.969

August 20, 1997

Mr. Paul Mizue
Acting Chief, Planning and Operations Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of April 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DOA-1 - Wetlands

As indicated in Section 3.12 of the Draft EIS, the wetlands found within the airport area, with the exception of Kanaha Pond Wildlife Sanctuary, are ephemeral or short-lived. However, the Proposed Airport improvements will not result in a loss of the intermittent wetland areas found near the Airport.

COMMENT DOA-2 - Drainage System Improvements

The Hawaii State Department of Transportation, Airports Division, will continue to keep your agency informed of the proposed drainage system improvements and file necessary permit applications with the U.S. Army Corps of Engineers as required.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
600 Harrison Street, Suite 515
San Francisco, California 94107-1376

June 6, 1996

ER 96/0239

David J. Welhouse
U.S. Department of Transportation, Federal Aviation Administration
Honolulu Airports District Office
P.O. Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for proposed Kahului Airport Improvements, Kahului, Maui, Hawaii. The following comments are provided for your consideration when preparing the Final Environmental Impact Statement (FEIS).

GENERAL COMMENTS

The DEIS addresses three major issues which concern the Department of the Interior. One concerns possible disturbance of species listed as endangered under the Endangered Species Act of 1973 (ESA). See Comment OEPC-1

These species include: Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), and Hawaiian duck (*Anas wyvilliana*). Increased overflights during construction also would disturb native black-crowned night-herons (*Nycticorax nycticorax hoactli*) and migratory Pacific golden-plovers (*Pluvialis fulva*) at the nearby Kahana Pond due to increased overflights during project construction. See Comment OEPC-2

A second issue involves possible collision of Hawaiian stilts with aircraft due to the stilts' attraction to runway areas that provide foraging habitat. The third is the potential increase in number and variety of alien species accidently being introduced from the proposed direct overseas flights from Asia and the Pacific. Introduced alien species could seriously adversely affect species federally listed as threatened and endangered on Maui. See Comment OEPC-3

As the proposed project constitutes a major construction activity, the Department recommends a Biological Assessment (BA), as specified in 50 CFR Part 402.12, be prepared.

The BA would help determine: 1) whether direct and indirect impacts of the project, including the potential for alien species introductions, may seriously adversely affect listed species on Maui, and 2) whether formal section 7 consultation under the ESA is appropriate.

FWS is available to assist Department of Transportation/Federal Aviation Administration (DOT/FAA) with this endeavor.

At the May, 1994 scoping meeting for the proposed project, the National Park Service (NPS) expressed concern over potential impacts that introduction of alien species could have on biological resources of Haleakala National Park. The Superintendent recommended the following topics be fully described and addressed in the FEIS:

1. Kahului Airport area environment and its conduciveness to survival of introduced alien species arriving aboard aircraft from foreign countries;

2. Special quarantine and inspection/prevention measures necessary to decrease likelihood of accidental alien introductions contained in baggage and carried by passengers;

3. Monitoring measures necessary for early detection of introduced alien species;

4. Contingency action plans for locating and eradicating serious pests such as the brown tree snake should a nucleus population be established; and

5. Cumulative assessment of impacts alien species arriving from foreign countries might have on native Hawaiian plants and animals in Haleakala National Park with special emphasis on endangered species.

The DOT/FAA has not satisfactorily addressed these topics.

Virtually no attempt has been made to assess potential impacts to unique native Hawaiian ecosystems of Maui. The NPS requested Cooperating Federal Agency status to assist with this assessment, but was denied opportunity to participate.

The Department will seriously consider recommending referral of this proposed project to the Council on Environmental Quality in accordance with procedures specified in 40 CFR 1504 should these issues remain unaddressed in the FEIS.

SPECIFIC COMMENTS

Page 3-92 to 95. Volume I, Section 3.11.2 FAUNA The DEIS explains that attraction of Hawaiian stilts to runway areas would be prevented or minimized by hazing stilts from the area and See Comment OEPC-4

implementing certain maintenance measures. These measures include drainage improvements and plantings. The FEIS should provide a plan with sufficient details of drainage improvements and descriptions of the plantings so assessment of the effectiveness of these measures can be made.

The FWS continues to be available to provide technical assistance in the development and implementation of such a plan.

<u>Pages 3-99 to 100. Section 3.11.3.2 Impact Analysis and Page 3-101. Section 3.11.3.4 Mitigation Measures</u> We are concerned about conclusions outlined in the DEIS regarding alien species' introductions resulting from the proposed project. In section 3.11.3.2, the DEIS states "As the passenger levels and cargo/mail tonnage are similar to both the No-action and Proposed Project, the impact of the Proposed Project on alien species infestation is, in and by itself, insignificant." See Comment OEPC-5

The FWS disagrees with this statement and with the statement regarding alien species introductions in section 3.11.3.4 "There are no significant impacts due to the Proposed Project and, therefore, no mitigation is necessary."

We believe the rate and diversity of alien species' introductions to Maui would increase and these introductions could result in severe adverse impacts to threatened and endangered species on Maui. The initiation of direct flights from Asia and/or Pacific nations would provide an entrance route for alien organisms from these areas directly to Maui. This may increase the rate and diversity of new alien species' establishment on Maui which, in turn, could adversely affect Maui's endangered species.

Potential impacts from alien species are not necessarily limited to the immediate area of the airport and have the potential for island-wide consequences, particularly in sensitive areas like Haleakala National Park.

<u>APPENDIX J FAUNAL (BIRD AND MAMMAL) STUDIES. DEIS Volume II</u> FWS agrees with the faunal studies results which show species listed as endangered waterbirds and migratory shorebirds are not disturbed by overflights of the kind expected during project construction. Therefore, the Department concurs with conclusions outlined in the DEIS regarding disturbance of endangered waterbirds and migratory shorebirds at Kahana Pond. See Comment OEPC-6

<u>APPENDIX O - ALIEN SPECIES ACTION PLAN</u> The Kahului Airport is extremely vulnerable to accidental introduction of alien species from arriving international aircraft. Wind patterns and adjacent agricultural lands increase the probability for accidental introductions at the Kahului Airport area. See Comment OEPC-7

The Kahului Airport area should be studied to assess survival of alien species likely to be transported on aircraft from foreign countries. The results should be analyzed and discussed in subsequent project documents.

Because of the extent of concern for the introduction of alien species associated with this proposed project, the Department recommends the FEIS provide mitigation that would reduce the threat of alien introductions. In addition, the Record of Decision should contain a formal commitment to this mitigation. These committed mitigation measures should include but not be limited to the following actions:

1. Quarantine and inspection procedures necessary to reduce the likelihood of alien introductions; and

2. Monitoring and contingency action plans for locating and eradicating potentially harmful alien species which establish themselves on Maui despite protective procedures.

We commend the DOT/FAA for including the Hawaii Alien Species Action Plan (ASAP) in the DEIS. However, support for some recommendations given in the ASAP should have been provided in other sections of the DEIS.

Since this proposed expansion of runways carries significant, long-term consequences, development and commitment to a long-term adaptive management plan is necessary to assure that funding and personnel are available in future so that mitigation measures continue to be carried out and airport operations are adaptively managed to protect endangered species on Maui.

For any questions on Fish and Wildlife Resources or assistance with ESA issues or compliance, please contact Mr Robert Smith, Pacific Islands Ecoregion Manager, at (808) 541-2657.

For questions on National Park issues, please contact, Mr. Donald W. Reeser, Superintendent of Haleakala National Park, at (808) 572-1304.

We appreciate the opportunity to provide these comments.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc: Director, OEPC, w/original incoming
Regional Director, FWS, Portland
Field Director, NPS, PWFA

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.1053

August 20, 1997

Ms. Patricia Sanderson Port
Regional Environmental Officer
U.S. Department of Interior
Office of the Secretary
Office of Environmental Policy and Compliance
600 Harrison Street, Suite 515
San Francisco, California 94107-1376

Dear Ms. Port:

ject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AMI011-07

Thank you for your comment letter of June 6, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT OEPC-1 - Impact of Proposed Project on Endangered Species

As indicated in your letter, the Draft EIS has addressed the three major issues which concern the possible disturbance of species listed as endangered under the Endangered Species Act of 1973. These major issues include: (i) increased overflights of Kanaha Pond during construction, (ii) possible collisions of Hawaiian stilts which are attracted to the runway areas that provide foraging habitat, and (iii) the potential increase in the number or variety of alien species introductions. The potential effects of the Proposed Project on endangered species within the airport boundaries are discussed in Section 3.11.2 of the Draft EIS.

We acknowledge your concurrence with the conclusions in the Draft EIS, regarding the impact of the overflights of Kanaha Pond Wildlife Sanctuary and the potential impacts on the three endangered bird species, (the Hawaiian stilt, Hawaiian coot and Hawaiian duck).

COMMENT OEPC-2 - Effect of Proposed Project on Hawaiian Stilts and Possible Collisions

The hazing of and impacts of the Hawaiian Stilts on the airfield are discussed in 3.11.2 of the Draft EIS. As stated in the Draft EIS, when water is available the Hawaiian Stilt and other bird species frequent the intermittent ponding areas found within the airport boundaries. These intermittent ponding areas will be graded to discourage ponding and minimize the occurrence of the Hawaiian Stilt on the airfield. This will minimize the potential for Hawaiian Stilt and aircraft strikes. Other landscaping measures may be employed in order to further discourage the use of the airfield by the Hawaiian Stilt. The Hawaii Department of Transportation (HDOT), Airports Division, will continue to work with the Department of Interior Fish and Wildlife Service (FWS) to discourage the use of the airfield by the Hawaiian Stilt. As these measures are developed, the HDOT, Airports Division, will continue to discuss these measures with the FWS prior to their implementation. Any assistance the Service is willing to provide in this regard will be appreciated.

In addition, the U.S. Department of Agriculture, Animal Damage Control Division (ADC), has obtained a permit from the FWS to haze the Hawaiian Stilt from the airfield. The ADC has coordinated their efforts with the appropriate agencies, including the FWS.

COMMENT OEPC-3 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), FWS, and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding

the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, the future expansion of domestic or international service will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations, general economic conditions, and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that th introduction of alien species is a potentially significant cumulative impact.

As requested in your letter, and as a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with your agency to be consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding the analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation

measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by your agency in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. The proposed mitigation measures are attached.

COMMENT OEPC-4 - Mitigation Measures Regarding Hawaiian Stilt

See response to Comment OEPC-2, above.

COMMENT OEPC-5 - Alien Species Conclusions

See response to Comment OEPC-3, above.

COMMENT OEPC-6 - Faunal Studies

We appreciate your concurrence with the faunal surveys contained in the Draft EIS.

COMMENT OEPC-7 - Alien Species Action Plan

See response to Comment OEPC-3, above.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

MAY 1 E 1997

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS ECOREGION
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RECEIVED
MAY 1 6 1997
EDWARD K. NODA & ASSOCIATES

In Reply Refer To: MSS

MAY 1 5 1997

Mr. Howard Yoshioka
Manager, Airports District Office
U.S. Department of Transportation
Federal Aviation Administration
300 Ala Moana Blvd. Rm. 7116
Honolulu, Hawaii 96813

Dear Mr. Yoshioka:

A native Hawaiian moth, Blackburn's sphinx moth (*Manduca blackburni*), has been proposed for listing as the first Hawaiian insect considered for protection under the Endangered Species Act (ESA). The moth, with a wingspan of up to five inches, was considered extinct in the late 1970s but a single population of the moth was discovered on public land at Kanaio in 1984. That population is the focus of a study and recovery efforts by the Fish and Wildlife Service. Another smaller population of the moth was recently discovered this year at Sprecklesville.

Although the Sprecklesville population is within the project vicinity of the proposed expansion for Kahului Airport, the Service does not believe that the proposed action will present the likelihood of jeopardizing the continued existence of this proposed species. Section 7 (a)(4) was added to the ESA to provide a mechanism for identifying and resolving potential conflicts between a proposed action · ·d a proposed species at an early planning stage. While consultations are required when the ,osed action may affect listed species, a conference is conducted when the proposed aciton may present the likelihood of jeopardizing the continued existence of a proposed species. Therefore, the Service does not believe that a conference is necessary as identified in 50 CFR Part 402.10 unless your agency so requests.

The Fish and Wildlife Service will address the moth in its biological opinion for the proposed project and indicate that mitigation measures associated with the project to avoid impacts to listed species on Maui will also benefit the sphinx moth.

Thank you for the opportunity to provide you with our input on this issue. Should you have any questions please contact our Program Leader for Interagency Cooperation, Ms. Margo Stahl, or Fish and Wildlife Biologist Dr. Jeff Burgett at 808/541-3441.

Sincerely,

Brooks Harper

Brooks Harper
Field Supervisor
Ecological Services

cc: Richard Hill, Region I
HDOT
Edward K. Noda & Associates
National Park Service

United States Department of the Interior

NATIONAL PARK SERVICE
Haleakalā National Park
P.O. Box 569
Makawao, Maui, Hawaii 96768

IN REPLY REFER TO

TAKE PRIDE IN AMERICA

STATEMENT BY NATIONAL PARK SERVICE
KAHULUI AIRPORT IMPROVEMENTS DRAFT EIS

DONALD W. REESER

SUPERINTENDENT, HALEAKALĀ NATIONAL PARK

March 8, 1996

I am speaking for the National Park Service, Department of the Interior.

The Hawaii Department of Transportation/Federal Aviation Administration 1996 Draft Environmental Impact Statement has failed to address the impacts airport runway extension and internationalization will have on Haleakalā National Park resources. At the May 1994 scoping meeting the National Park Service recommended that the following topics be fully addressed in the federal EIS:

- Kahului Airport area environment and its conduciveness for the survival of introduced alien species arriving aboard aircraft from foreign countries.

-- Special quarantine and inspection preventative measures necessary to decrease the likelihood of accidental alien introductions contained in baggage and carried by passengers.

-- Monitoring measures necessary for early detection of introduced alien species.

-- Contingency action plans for locating and eradicating serious pests such as the brown tree snake should a nucleus population be established.

-- Speculative assessment of the impacts alien species arriving from foreign countries might have on native Hawaiian plants and animals in Haleakalā National Park with special emphasis on endangered species.

DOT/FAA has chosen to ignore these topics. Virtually no attempt was made to assess the potential impacts to the unique native Hawaiian ecosystems of Maui. The National Park Service requested Cooperating Federal Agency status to assist with this assessment, but was denied the opportunity to participate. The National Park Service intends to refer this matter to the Council on Environmental Quality.

Before the final EIS is prepared we strongly recommend that professional scientists and managers engaged in native Hawaiian ecosystem preservation be consulted on the potential impacts of the project on native ecosystems island-wide.

Attached is a review of the EIS we requested from Dr. Lloyd Loope, National Biological Service.

Thank you for the opportunity to comment.

See Comment NPS-1

PROPOSED EXPANSION OF KAHULUI AIRPORT--IMPACTS TO HALEAKALA NATIONAL PARK

By Don Reeser, Superintendent, Haleakalā National Park 4/96

QUALITIES OF HALEAKALA NATIONAL PARK

Established in 1916, Maui's only national park, comprising 28,800 acres from 10,021 ft. elevation to sea level, is a national wilderness area, international biosphere reserve, and Maui's number one tourist destination receiving over 1.6 million visitors annually. It is the home of more endangered and threatened species than any other national park in the country. It is a partner in ecosystem preservation with surrounding land management organizations of east Maui.

WHY AN INTERNATIONAL AIRPORT ON MAUI MAY BE THE NATIONAL PARK'S GREATEST THREAT

Reputable ornithologists, botanists and ecologists can substantiate that new introductions of alien species arriving aboard foreign aircraft and becoming established in the very hospitable Maui environment represent a significant threat to the biotic resources of Haleakalā National Park. It can be scientifically substantiated that virtually all organism extinction and reduction of biological diversity in the park can be linked to the introduction (accidental or intentional) of non-native life forms. Furthermore, there is substantial evidence indicating that expanded foreign air service of the type that will be facilitated by the proposed airport expansion is a significant source of introduction of non-native life forms likely to damage the endangered, threatened and candidate species that inhabit Haleakalā National Park. There is a very high probability of accidental or intentional introduction of non-native life forms if expansion of the airport results in expanded foreign air service.

Haleakalā National Park's most critical concern for the airport expansion involves whether quarantine facilities and personnel will be adequate for handling of increased passengers and cargo. Honolulu International Airport is already a center for introductions of alien plants and animals to the Hawaiian Islands in spite of a well established system for detecting and disposing of potentially dangerous organisms. In spite of safeguards, two dozen new species become established in the islands each year. Many of these turn out to be destructive agricultural pests; others threaten the endemic Hawaiian plants and animals which survive largely in national parks and state forest and natural area reserves. One example of the alien introductions which can destroy our wildlife is the Brown Tree Snake native to Australia and Melanesia. This snake was accidentally introduced to Guam in the 1940s and has since destroyed almost all the native bird life of Guam. It also causes many millions of dollars of damage to agriculture and electric utilities on Guam. The snake is a prime threat for establishment on other islands in the Pacific, including the Hawaiian Islands, since it is abundant on Guam and seeks refuge during the day in dark places, such as cargo containers. Several of these snakes have been detected and destroyed on Oahu in the past few years.

Even the best quarantine facilities will not likely be able to cope with the thousands of potential insect introductions resulting from direct flights from tropical countries.
Factors at Kahului Airport make it a much more hospitable environment for alien invasion than Honolulu International Airport which is currently at best a "leaky sieve." These include: moister climate, sugar cane fields nearby runways, prevailing winds blow insects inland and the elevation range to 10,000 ft. provides a great diversity of habitats for arriving aliens.

LEGAL AUTHORITY MANDATING PROTECTION OF NATIONAL PARK RESOURCES

The proposed airport expansion is a federal action subject to Section 7 of the Endangered

Species Act. Under that Act it is the duty of every Federal agency to "insure that any action authorized, funded or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or resulting in the destruction or adverse modification" of the critical habitat of the species." 16 U.S. Code section 1536(a) (2)

The high probability of the intrusion of damaging non-native species into Haleakalā National Park raises substantial prospect of a resulting damaging "use" of the park and the habitat of endangered species within the park. The threat of that impact is sufficiently significant that it may reasonably be considered as potentially falling within the "use" regulated by Sect. 4(f) of the Department of Transportation Act 43 U.S. Code Sect. 303(c), as well as the parallel provisions of the Airport and Airways Improvement Act.

Finally, the threat of these impacts also raises substantial issues concerning compliance with the basic legislative policies that govern protection of our national parks, including Haleakalā. These policies are embodied in the 1916 National Park Service Organic Act, reinforced by the Redwood Amendments. These Acts require national parks to be left "unimpaired for the enjoyment of future generations," and also "the protection, management and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established."

DRAFT EIS FOR KAHULUI AIRPORT IMPROVEMENTS, MARCH 1996 VERSION

In 1993, the National Park Service requested the Federal Aviation Administration that it be granted Cooperating Agency status in the preparation of the federal EIS, but was denied despite the recommendations of the Department of the Interior (Office of Environmental Policy and Compliance) and the Environmental Protection Agency. As it turned out the National Park Service was not even consulted during the EIS preparation.

Unfortunately the EIS does not address impacts to the park. DOT/FAA concedes that there is an alien species problem statewide but does not acknowledge there are special problems associated with Kahului Airport environs and potential international flights to Maui. They lean entirely on the Alien Species Action Plan Project. It is clear they fear this topic could founder the entire project and require reconsideration of the threats of alien species invasions at Kahului Airport and perhaps other airports in the state.

They further obfuscate the main issue by stating there are international flights from Canada arriving already, and that if the airport is fully internationalized some additional permitting steps would have to be accomplished. DOT/FAA has purposely ignored the National Park Service's concerns. Skirting these issues is DOT/FAA's only hope in avoiding significant design and operational changes to protect Haleakalā National Park .

SUMMARY

Haleakalā is one of this country's 54 great national parks, an international biosphere reserve, a wilderness area and the home of more threatened and endangered species than any other national park. The park together with adjacent lands managed by The Nature Conservancy and State of Hawai'i Natural Area Reserve Department, represents perhaps the finest tropical rain forest in the United States. Not development, not human visitation, only alien species threaten this irreplaceable resource. Through aggressive resources management/research program the pa is making real progress against established aliens and we are optimistic about the future of system preservation--but not if we have foreign flights landing directly on Maui.

Of our fifty-four national parks Haleakalā is number 51 in land area. The average national park is well over twice the size of Maui. Haleakalā is only 15 miles from the airport. It is too late to wage war against an alien organism only at the park boundary. In recent years we have attacked potential invaders outside the park through direct action and by making the public aware of the problem. The news media and public have been very cooperative in helping to eliminate threats to Haleakalā.

This is more than just a local issue. We believe it ranks with external threats to other national parks, e.g. logging upslope of the tallest redwoods; geothermal development outside Yellowstone; reduced water supply to Everglades.

Instead of creating the probability of more alien introductions to Maui, the National Park Service believes all current avenues of evasion including present interisland air and shipping services should be closely scrutinized and adequate inspection and quarantine measures adopted.

The second edition of the Kahului Airport EIS has failed to confront the alien species issue head on. If this project is allowed to be implemented as is, it means disaster for Maui's unique native Hawaiian ecosystems that makes Maui such a special place for residents and visitors alike.

Donald W Reeser

National Biological Service, Pacific Islands Science Center, Haleakala National Park Field Station (Phone 808-572-9306, ext. 5936) (Fax 808-572-1304)

April 12, 1996

To: Superintendent, Haleakala National Park

From: Lloyd Loope, National Biological Service

Subject: Preliminary comments on Draft EIS for Kahului Airport Improvements, March 1996 version

The memo from me and Art Medeiros of February 28, 1994, to you, reproduced in Volume II of the EIS, seems just as pertinent as ever since it raises many issues which the EIS makes no attempt to address. It should be noted that we have been raising these same concerns consistently since at least 1990, as is well documented by a nice article by Dave Deleon on page 1 of The Maui News, March 20, 1990. Unfortunately, the DOTs have just as consistently ignored our concerns. Environmentalists are often castigated for "delaying tactics"; it seems that this case is purely one of stonewalling by the DOTs.

In their letter of February 16, 1994, rejecting the National Park Service as a Cooperating Agency for EIS preparation federal DOT implied that the alien species/endangered species connection is a non-issue and that even if it were an issue the agency with jurisdiction would be the U.S. Fish and Wildlife Service, not NPS. A recent (April 1996) USFWS proposal for its "Pacific Islands Ecoregion Coastal Ecosystems Program" puts the alien species/endangered species connection in proper perspective: "The program area has over 300 listed and proposed species and over 600 candidates and species of concern... Although conversion of habitat and excessive exploitation play a role in island extinction crises, introductions of alien predators, competitors, parasites, and pathogens are the dominant threats to most island endemics. Self-propagating, insidious, and often impossible to eradicate, these alien species pose long-term conservation problems with no easy solutions."

I have no quarrel with the DOTs' evaluation (e.g. page 5-11) that these proposed improvements per se will have only cumulative impacts, not immediately accelerating the severity of the alien species problem, assuming no increase in international flights. There is no doubt, however, that the proposed improvements comprise a highly significant infrastructural increment leading to major future impacts of alien species arriving on direct flights from international ports. The DOTs admit this in section 8 because they were required to address the internationalization question by the Court Order of March 1991.

In spite of the Court Order, however, the DOTs are still speaking out of both sides of their mouth. In their letter of February 16, 1994, rejecting the National Park Service as a Cooperating Agency for EIS preparation federal DOT argued that internationalization is not an issue because "international (foreign) flights are already using the airport on a charter basis." Further, it is sanctimoniously pointed out in the EIS (page 8-3) that because Kahului Airport has received federal funds, the HDOT "cannot discriminate against any aircraft that wishes to use the airport" and must therefore accept any international flight, presumably whether or not there are inspection personnel available. (Remember that in spite of talk about "cumulative" impacts it takes only one contaminated flight to bring in a brown tree snake or some other devastating pest.) The lengthened runway will clearly result in an increase in non-scheduled international flights. The "pre-inspected" ones from Canada which are already coming may not be a large threat because of Canada's high latitude. However, the spectre of even relatively few direct flights from Japan and from the economically booming countries of southeast Asia into Maui is truly alarming, especially since there is apparently by law no other mechanism for limiting them than runway length.

The EIS assures us (page 8-3,4,5,6) that before scheduled international flights are allowed to come into Kahului Airport, more hoops must be jumped through, including approval of scheduled international service and approval and construction of facilities, both with "additional environmental analysis" and review by "a number of U.S. government agencies." The implication seems to be that the appropriate time to review possible impacts of alien species on international flights may be when the time comes to fully accommodate international flights with proper facilities. In effect they are saying, 1) international flights are already occurring so that there's nothing doable to stop them and 2) the actions proposed here do not lock Maui into receiving direct international flights. It seems that what we have here a classic case of (page 5-1) "cumulative effects that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions.." I would submit that such effects (from alien species introduction from international flights) are certain to be truly substantial.

The DOTs present themselves as guardians of the environment in section 3.11.3.4 on page 3-101: "There are no significant impacts due to the Proposed Project and therefore, no mitigation is necessary. However, to minimize environmental harm.. HDOT-AIR will continue to work with various government agencies to deter the introduction of alien species (especially pests) through its airports, to the extent possible...." The EIS gives considerable lip service to the "Alien Species Action Plan" (ASAP), a plan recently developed by over 80 state, federal, business, private and non-profit groups, with the goal of producing a strategy to strengthen Hawaii's protection against the alien pest invasion.

The implication is that alien species comprise a chronic statewide problem which is being taken care of by this plan. When one actually reads the key findings of the ASAP, however, one notes (page Q-2) a somewhat less business-as-usual attitude: "The Working Group confirms that the alien pest problem is growing rapidly, and that existing programs for prevention and control will fail to protect Hawaii without significant improvements." There is talk in the plan about the importance of innovation, teamwork, and coordination among organizations -- important items not epitomized by this EIS. It must be recognized, however, that the DOTs have more than a marginal responsibility for alien species introductions: Most new introductions arrive on airplanes, either as passenger-checked baggage or carry-on items, as live insects in the plan's interior, as air cargo, or as mail on airplanes. Furthermore, most new alien species almost invariably are first detected near Honolulu International Airport (J. Beardsley, personal communication). To expose a new airport site in an environment more ecologically susceptible to invasion by the inevitable new alien species introductions which will come on direct international flights, without meaningful mitigation or even meaningful analysis appears to me to be the epitome of irresponsibility.

The "mitigation measures" put forward (5-11,12) are pathetic when viewed from a Maui perspective. Let's assume that Kahului Airport receives 100,000 international visitors in 2015, with each assessed a fee of $1.45; this would make $145,000 per year available for quarantine inspections -- enough, perhaps, to provide funding for 2-3 quarantine inspectors (at current salary levels). The current quarantine operation at Kahului seems to be extremely dedicated and competent but woefully understaffed. In spite of continuing robust growth in Kahului airport traffic, the number of HDOA inspectors was reduced from 6 to 5 in 1994 for budgetary reasons (Larry Nakahara, HDOA, Testimony at Maui County Council Chambers, August 17, 1995 -- in reply to question from Councilman Arakawa). There is no way that Maui's "little brother" quarantine program can operate as effectively as the current world-class but leaky system in Honolulu, without major injection of funding and infrastructure. Adding to this the more hospitable environment for alien species around the Maui airport, there is clearly a recipe for disaster.

Clearly, drastic mitigation measures are warranted before Kahului airport becomes international. The best minds in the quarantine business should be brought together to design such measures. Some possibilities include (1) increasing the quantity of inspectors, (2) vastly improving their training, equipment, etc.; (3) creation of biological deserts (paved areas?) around the airport to retard the rapid spread of new aliens, and (4) enclosed (not open-air, exposed to the nearly omnipresent trade winds) inspection facilities.

National Biological Service, Pacific Islands Science Center, Haleakala National Park Field Station (Phone 808-572-9306, ext. 5936) (Fax 808-572-1304)

May 8, 1996

To: Superintendent, Haleakala National Park

From: Lloyd Loope, National Biological Service

Subject: Additional comments on Draft EIS for Kahului Airport Improvements, March 1996 version

My "preliminary" comments on the EIS, dated April 12, 1996, still appear to be valid. However, I would like to add new insights, based on the site inspection of May 2, arranged by Sol Kaho'ohalahala of the Maui County Council.

As reported in The Maui News on May 3, the group of Council Members and interested individuals were given, by Dennis Tokuoka of HDOA and Travis Richardson of USDA, some very basic information which sheds light on the alien species problem at Kahului airport.

1. The Hawaii Department of Agriculture (HDOA) is clearly seriously understaffed to accomplish even the very limited goals of inspection under which they are operating. They have a total of 7 inspectors for the island of Maui, responsible for the airport, harbors, inspection of nurseries, preinspection of plants bound for the mainland, etc. At any given time, a maximum of 2-3 inspectors may be available to meet flights from continental U.S. Mr. Tokuoka and his staff are clearly highly competent and committed to doing what they can to stop alien species arrivals. However, in spite of their huge mandate (much larger than the USDA mandate) to protect Hawaii's agriculture and natural ecosystems, it is clear that the program is woefully understaffed and lacking in infrastructure, equipment and legal authority.

2. In contrast to the state quarantine program (HDOA), which is the only line of defense for intercepting pests coming into Maui, the federal quarantine program (USDA) is responsible for intercepting pests from Maui, bound for the U.S. mainland. This program at Kahului is staffed by 55 half-time inspectors and 9 full-time inspectors (equivalent of 32 full-time inspectors, or 4.6 times as many as the state program). Mr. Richarson stressed the importance of the new color scanners ($75,000 each), which are extremely effective for detecting organic matter in baggage. It is clear that the USDA inspection of baggage and passengers leaving Kahului airport for the mainland is largely effective. And it is clear that HDOA could do a much better job at meeting their larger mandate if they had comparable staff, equipment, and advantages of airport design.

3. The most alarming piece of information I learned is that there is no enclosed air cargo facility at Kahului airport where cartons and containers can be inspected. HDOA opens a carton for inspection and insects fly out, to be carried off into the isthmus of Maui by the trade winds. What is needed is an enclosed facility where fumigation can be implemented.

4. We learned that the Air Canada flights coming in to Kahului airport normally receive no agricultural inspection. The rationale is that they are preinspected by U.S. Customs (with no access to agricultural experts) before leaving Canada.

5. Although the EIS claims (p. 1-9) that the NPS (and presumably its NBS advisors) has no "'special expertise' within the airport area," I feel that I have sufficient expertise to make the judgment that the existing quarantine system at Kahului airport to prevent establishment of new pests on Maui (many of which will eventually reach Haleakala National Park) is pathetically inadequate and that this EIS process is the first formal opportunity the U.S Department of the Interior has had to address the problem. I realize that it is not entirely the responsibility of the federal and state Departments of Transportation to remedy this problem, but I am confident that it is their responsibility to bring the problem to light in the EIS and to make good faith efforts, in cooperation with other responsible agencies (all participants in the Alien Species Action Plan), to mitigate. We need creative approaches to making things better, not more of their infuriating head-in-the-sand approach.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

IN REPLY REFER TO
AIR-EN
97.1054

August 20, 1997

Mr. Donald W. Reeser
U.S. Department of Interior
National Park Service
Haleakala National Park
P. O. Box 369
Makawao, Hawaii 96768

Dear Mr. Reeser:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of March 8, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT NPS-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations, general economic conditions, and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is

available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

We would also like to thank you and Dr. Lloyd Loope for your participation on the Biological Assessment Technical Panel. Your contributions to a better understanding of the alien species problem have allowed us to prepare a biological assessment that fully meets the requirements of the FWS.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

United States Department of the Interior

NATIONAL PARK SERVICE
Haleakala National Park
P.O. Box 369
Makawao, Maui, Hawaii 96768

IN REPLY REFER TO

A38

May 17, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Welhouse:

Enclosed is additional analyses and documentation regarding the Draft EIS for Kahului Airport Improvements, March 1996.

National Park Service asserts that the Draft EIS provides an inadequate analysis of the environmental impacts to Haleakalā National Park from the introduction of alien species. This subject must be fully analyzed in the EIS before meaningful project-specific review of the impacts and proposed mitigation measures for the proposed airport expansion can be provided. The National Park Service requests that it have the opportunity to review and comment on this project after a complete EIS is drafted. See Comment NPS-1

Sincerely,

Donald W. Reeser

Donald W. Reeser
Superintendent

National Biological Service, Pacific Islands Science Center, Haleakala National Park Field Station (Phone 808-572-9306, ext. 5-5936) (Fax 808-572-1304)

May 17, 1996

To: Superintendent, Haleakala National Park

From: Lloyd Loope, Research Scientist, National Biological Service

Subject: Review of statements made (or erroneously omitted) in the Draft EIS for Kahului Airport Improvements, March 1996, about alien species and their pertinence to Haleakala National Park

The treatment of the alien species issue in the Draft EIS is flagrantly inadequate, especially as it relates to Haleakala National Park and to federally-listed endangered species of plants and animals. This is particularly unfortunate, since the U.S. Department of the Interior, National Park Service, could have assisted two years ago as a cooperating agency in Draft EIS preparation, through providing information on past, present, and future impacts and through helping to develop mitigation. In order to facilitate preparation of a complete EIS and to expedite mitigation, I attempt here to touch upon some major points which need to be addressed, specifically in response to the Draft EIS. I include copies of many of the references cited in order to facilitate and expedite incorporation of a meaningful alien species analysis in this environmental review document.

1. (Draft EIS, p. 1-9) The "NPS has no jurisdiction or 'special expertise' within the airport area" because "Haleakala National Park is remote from the airport, i.e., approximately a distance of twenty miles." This statement seems to be made from a basis of ignorance and/or cynicism. Impacts of alien species on Haleakala National Park are well documented (e.g. Stone and Loope 1987; Brockie et al. 1988; Cole et al. 1992; Loope et al. 1992; Medeiros et al. 1992, 1993; Loope and Medeiros 1994,1995). Impacts of alien species in the Hawaiian Islands are very well documented (e.g. Howarth 1985, 1990; Howarth and Ramsay 1991; Scott et al. 1986; Stone et al. 1992; Gillespie and Reimer 1993). The special vulnerability of the animals and plants of oceanic islands to displacement through invasion of alien species is also well documented (e.g. Loope et al. 1988; Brockie et al. 1988; MacDonald et al. 1989; Loope and Mueller Dombois 1989; D'Antonio and Dudley 1995). The special importance of the biota of oceanic islands in general and of the Hawaiian Islands in particular as part of the nation's and the world's natural heritage has been emphasized by Williamson (1981), Simon (1987), Loope et al. (1988), and many others.

In the event that there could possibly be any question about whether alien species introduced at Kahului Airport are likely to reach Haleakala National Park and degrade its ecosystems, I will cite two examples, the first illustrating rapid invasion and the second illustrating slower but devastating invasion:

a) the western yellowjacket (Vespula pensylvanica) on Maui -- Nakahara (1995) mentioned "yellow-jacket queens" as among the pest organisms detected by HDOA inspectors at Kahului Airport. In fact, the western yellowjacket was first detected on Maui in 1978 (in Iao Valley at low elevation, not far from Kahului Airport), probably from a colony which had been established the previous year (Gambino et al. 1990). In 1979, yellowjacket colonies were detected at widely separated sites (12 km) on upper Haleakala volcano above 2,000 m elevation; the species has since thrived within Haleakala National Park, posing a severe threat to the native invertebrate fauna. Predation of yellowjact workers on rare, endemic insect species of Haleakala National Park has been well documented by Gambino et al. (1987).

b) the brown tree snake (Boiga irregularis) -- Expansion of the range of the brown tree snake from its apparent area of establishment to the extremities of the island of Guam is given in Figure 1 of Savidge (1987). On Guam, the snake's range expanded over a linear distance of about one mile per year, reaching densities of 40 snakes per acre, eliminating all native birds, and causing dramatic economic and human lifestyle impacts. Much effort has been expended to date in developing control measures for the snake, but no effective control method is on the horizon. Extrapolating from the case in Guam, it might be expected that, if the snake were to become established around Kahului Airport, it could reach Haleakala National Park within 15-20 years, and within roughly 40 years could complete its destruction of native bird life in Haleakala's and Maui's forests.

2. (Draft EIS, p. 1-30) "There will be insignificant impacts to endangered or threatended species of fauna." Yet the island of Maui has approximately ten endangered terrestrial vertebrate animal species and more than 60 endangered plant species (compiled from USFWS 1994 and updates), any of which could be driven to extinction as a result of future introductions of alien species through Kahului Airport. U.S. Fish and Wildlife Service, Honolulu Office, should be contacted by the consultants compiling this EIS to obtain more precise and up-to-date numbers. USFWS (1996) confirms that "introductions of alien predators, competitors, parasites and pathogens are the dominant threats to most island endemics" in Pacific Island ecosystems.

3. (Draft EIS, p. 2-50,51) Claim is made that the multiagency Alien Species Action Plan, version of October 19, 1994, was used in the analysis and assessment process for the Draft EIS. Yet the draft EIS fails to mention or analyze the first of their key findings (p.Q2): "The Working Group confirms that the alien species problem is growing rapidly, and that existing programs for prevention and control will fail to protect Hawaii without significant improvement." Neither is there emphasis on what should have been the major thrust of the Draft EIS and is given as the 2nd immediate priority of the ASAP (after "Form a Coordinating Group"): "Improve effectiveness of inspections through coordination of U.S. Department of Agriculture, U.S. Fish and Wildlife Service, U.S. Postal Inspection Service, U.S. Customs Service, Hawaii Department of Agriculture, and Military Customs Inspection Program inspectors."

Unfortunately, instead of taking the lead in trying to close very real gaps in the quarantine inspections as the DOTs should do, they have up to now refused to concede that they have any responsibility for the problem. Yet it is clear that construction of airports allows alien species introduction and that airport design is a critical factor in determining whether or not quarantine is effective (e.g. airtight air cargo facilities, routing of baggage coming off airplanes, etc.). The DOTs should have all agencies involved in quarantine and in the Alien Species Action Plan to review the Draft EIS and to assist in mitigation. If the DOTs are incompetent to take the lead in developing mitigation for the alien species problem, they should request that a competent Cooperating Agency do so. Biologists with the U.S. Department of the Interior in Hawaii were asked (for a recent biodiversity symposium) to address the issue of strategies to reduce erosion of biodiversity by alien species (Loope and Stone 1996). Howarth (1985) summed up part of the solution nicely: "Probably the most cost-effective measure to reduce the negative impacts of alien invertebrates in the Islands is to stiffen quarantine procedures in order to greatly lessen the chance that a harmful alien will be intentionally or inadvertantly introduced. Quarantine cannot hope to be absolute in keeping everything out, but it is a method to buy time between crises and allow for the development of management strategies."

Excellent expertise is available among membership of the Steering Committee of ASAP. What is obviously needed is to bring together whatever expertise is available to address proper mitigation of alien species introduction at Kahului Airport. [Incidentally, the statement on p. 3-98 of the Draft EIS that "Recently, over 80 state, federal, businesses, private and non-profit groups have collaborated in the (ASAP) Working Group to produce a strategy.." is false, and serves unproductively to exaggerate the level of coordination necessary to get a handle on pest introductions. The statement seems to refer to the individuals cited as members of strategy planning groups (Appendix Q). In reality, these people seem to belong to no more than 20 agencies or organizations. The really key agencies which need most to coordinate their efforts to prevent introductions through holes in the quarantine system to prevent alien species introductions are HDOA-PPQ, USDA-APHIS, U.S. Customs, U.S. Postal Service, and the military.]

4. (Draft EIS, p. 3-97,101) Claim is made here and elsewhere that the increase in the rate of alien species introduction caused by the proposed expansion of Kahului Airport will be insignificant. This claim lacks credibility, especially since there is no indication that the preparers of the Draft EIS understand the seriousness of the problem. A concise definition of harmful alien species is given on p. 3-98, with authority given to Section 11, reference 21 ("Executive Summary, Alien Pest Prevention and Control, Alien Species Action Plan"). No information source on alien species other than the ASAP has been cited, although abundant documentation of the alien species problem in Hawaii and elsewhere exists and should be cited and used in analysis (e.g. Nature Conservancy of Hawaii and the Natural Resources Defense Council. 1992.; U.S. Congress, Office of Technology Assessment, 1993).
These references emphasize the inadequacy of current measures to prevent arrival of alien species through airports.

5. (Draft EIS, p. 5-11) Claim is made that the alien species problem is being addressed in Hawaii by 20 agencies/organizations and $50 million and that the Alien Species Action Plan (Appendix Q) is addressing this statewide issue. Yet less than $300,000 per year (or

0.6% of the total) is apparently spent annually for inspections of incoming flights, passengers and cargo at Kahului Airport (based on number of inspectors reported in The Maui News, May 3, 1996, p.A1-2). This is the case in spite of the much more hospitable (for pests) agricultural and natural environment beyond the Kahului airport (vs. Honolulu, where much more $$ are spent, presumably).

6. (Draft EIS, p. 5-12) Claim is made that HDOT-AIR will provide support facilities (inspection machines, dogs, etc.) to assist USDA and HDOA in their inspection activities. However, the Draft EIS offers no description of the existing facilities nor any analysis of the amount or use of additional funds to be acquired. The collaborative track record to date is scandalously poor in this regard; for example, Kahului airport currently receives a substantial amount of air cargo without a proper enclosed air cargo facility in which pests discovered could be destroyed rather than dispersed by the trade winds into the highly hospitable (for pests) agricultural and natural environment beyond the airport (The Maui News, May 3, 1996, p.A1-2). An enclosed air cargo facility is obviously an essential need for a serious program aimed at preventing alien species introductions. It has been proposed by HDOA but has never been built. One wonders how many inadvertant introductions to Maui could have been avoided had a proper facility been available for air cargo inspections. An additional $19 million is programmed for expanded air cargo facilities (Draft EIS, p. 2-45:47). Is $19 million going to provide enclosed air cargo facilities appropriate for quarantine inspections on an oceanic island in the United States with biological resources comparable to the Galapagos and a national park with biota vulnerable to invasive species? Amazingly, no one preparing the Draft EIS seems to have considered this question! Virtually no details are given about the design of these highly important facilities.

The Draft EIS provides an inadequate analysis of the impacts on Maui's environment, including Haleakala National Park, from the introduction of alien species. This issue must be fully analyzed in the EIS before meaningful project-specific review of the impacts and proposed mitigation measures for the Proposed Airport Expansion can be provided. I would request, therefore, that the National Park Service, other agencies, and the public have an opportunity to review and comment on this project after a complete EIS is drafted.

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BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
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HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Hinaai

IN REPLY REFER TO
AIR-EN
97.1277

August 20, 1997

Mr. Donald W. Reeser
U.S. Department of Interior
National Park Service
Haleakala National Park
P. O. Box 369
Makawao, Hawaii 96768

Dear Mr. Reeser:

Subject: Additional Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 17, 1996, on the Draft EIS for the Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference. (Previous comment letters were submitted on March 8, 1996. These comment letters have been responded to separately).

COMMENT NPS-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural

Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

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As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment will summarize the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

We would also like to thank you and Dr. Lloyd Loope for your participation on the Biological Assessment Technical Panel. Your contributions to a better understanding of the alien species problem have allowed us to prepare a biological assessment that fully meets the requirements of the FWS.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZY HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

MAY 20 1996

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

May 13, 1996

Attention: David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 502440
Honolulu, HI 96850-0001

Dear Mr. Welhouse:

Enclosed are comments on the Draft Environmental Impact S .ement for Potential Environmental Impacts Associated with the Proposed Improvements to Kahului Airport, Kahului, Maui, Hawaii. We hope our comments will assist you. Thank you for giving us an opportunity to review this document.

Sincerely,

Donna Wieting

Donna S. Wieting
Acting Director
Ecology and Conservation Office

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
National Geodetic Survey
Silver Spring, Maryland 20910-3282

MAY 8 1996

MEMORANDUM FOR: Donna Wieting
Acting Director, Ecology and Conservation Office

FROM: Captain Lewis A. Lapine, NOAA
Director, National Geodetic Survey

SUBJECT: DEIS-9604-007--Potential Environmental Impacts Associated with the Proposed Improvements to Kahului Airport, Kahului, Maui, Hawaii

The subject statement has been reviewed within the areas of the National Geodetic Survey's (NGS) responsibility and expertise and in terms of the impact of the proposed actions on NGS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in the subject area is contained on the NGS home page at the following Internet World Wide Web address: http://www.ngs.noaa.gov. After entering the NGS home page, please access the topic "NGS Products and Services" and then access the menu item "NGS Products." This menu item will allow you to directly access geodetic control monument information from the NGS data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project include the cost of any relocation(s) required. See Comment USDOC-1

For further information about these monuments, please contact John Spencer; SSMC3, NOAA, N/NGS; 1315 East West Highway; Silver Spring, Maryland 20910; telephone: 301-713-3169; fax: 301-713-4175.

Attachments

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.961

August 20, 1997

Ms. Donna S. Wieting
Acting Director
Ecology and Conservation Office
U.S. Department of Commerce
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

Dear Ms. Wieting:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 13, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT USDOC-1 - Effect of Proposed Project on U.S. Geodetic Survey Monuments

The Proposed Project will not disturb or destroy any of the National Geodetic Survey monuments in the vicinity of the Kahului Airport.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

ry truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

STATE AGENCY COMMENTS

Benjamin J. Cayetano
GOVERNOR

HERMAN M. AIZAWA, PH.D.
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

April 26, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

Subject: Draft Environmental Impact Statement
Kahului Airport Improvements
Kahului, Maui, Hawaii

The Department of Education (DOE) has reviewed the subject project and has no comments. However the DOE is continually concerned with providing education in a quality atmosphere and would like to be included in the future updates for the subject project.

Thank you for the opportunity to respond. Should there be any questions, please contact the Facilities Branch at 733-4862.

Sincerely,

Herman M. Aizawa, Ph.D.
Superintendent

HMA:hy

cc: A. Suga, OBS
R. Murakami, MDO

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1107

August 20, 1997

TO: HERMAN M. AIZAWA, Ph.D., SUPERINTENDENT
DEPARTMENT OF EDUCATION

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your letter of April 26, 1997, on the Draft EIS for the proposed Kahului Airport Improvements. As requested, the State Department of Transportation, Airports Division, will keep the Department of Education informed of the progress of the proposed improvements to Kahului Airport.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

(P)1271.6

APR 22 1996

The Honorable Benjamin J. Cayetano
Governor, State of Hawaii
c/o Office of Environmental
Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Federal Aviation Administration (FAA)
800 Independence Avenue, SW
Washington, D.C. 20591

Gentlemen:

Subject: Kahului Airport Improvements
Wailuku, Maui, Hawaii
Draft EIS

Thank you for the opportunity to review the subject document. The proposed project will not impact any of our facilities. Therefore, we have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Sincerely,

SAM CALLEJO
State Comptroller

RY:jy
c: DOT, Airports Division
Edward K. Noda and Associates, Inc.

RECEIVED
APR 23 1996
EDWARD K. NODA & ASSOCIATES

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1109

August 20, 1997

TO: SAM CALLEJO, STATE COMPTROLLER
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your letter of April 22, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. The State Department of Transportation, Airports Division, will keep your office informed of the progress of the proposed improvements to Kahului Airport.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

May 23, 1996

Mr. Kazu Hayashida, Director
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Subject: Draft Environmental Impact Statement for the Kahului Airport Improvements, Maui.

Thank you for the opportunity review the subject document. We have the following questions and comments.

1. According to the draft EIS, "because these projects are beyond the year 2006 time frame, the full impacts of the larger projects in Phase 3 . . . may not be known and cannot be assessed properly at this time." The final EIS for the Kahului Airport Master Plan Update prepared in 1992 evaluated projects that are presently included in Phase 3 and assessed their potential impacts up to the year 2010. We recommend that all projects in Phase 3 (parallel runway, fuel pipeline, etc.) be fully evaluated in this EIS. See Comment OEQC-1

2. According to section 2.4.4 of the draft EIS, "the [9,600 feet] runway length would accommodate unrestricted overseas passenger aircraft operations to the U.S. Midwest (e.g., Chicago, Dallas, and Denver)." It does not include Far Eastern cities. However, the final EIS for the Kahului Airport Master Plan Update prepared in 1992 states, "A runway of [9,600 feet] would also allow non-stop flights from Maui to Far Eastern destinations such as Tokyo if route authority were granted . . . However, airlines would not use it for this purpose unless international arrival facilities were provided as well."

   Once Runway 2-20 is extended to 9,600 feet, non-stop flights from Tokyo could begin as soon as route authority is granted and temporary international arrival facilities are built. We recommend that non-stop scheduled passenger aircraft operations to Tokyo and other relevant international cities be See Comment OEQC-2

fully evaluated in this EIS.

3. According to the draft EIS, "the potential introduction of alien flora and fauna species through airports and other ports of entry is a major existing and future concern." Between 1992 and 2010, passenger arrivals and departures are expected to increase from 5.2 to 8.0 million people. During the same period, aviation operations are expected to increase from 180,000 to 250,000 operations.

   This increase will create more opportunities for alien species to invade Maui. In order to mitigate this impact, Kahului Airport must have adequate control mechanisms to prevent alien species from entering Maui. We recommend that an alien species action plan specific for Kahului Airport be developed and implemented. This plan must consider the latest methods and facilities to control alien species and prevent them from entering and flourishing on Maui. See Comment OEQC-3

4. The proposed location of the fuel pipeline runs immediately next to the Kanaha Pond Wildlife Sanctuary. According to the draft EIS, "the current location of this pipeline may have a potential impact on Kanaha Pond and the coastal water quality if leak or breakage occurs." Despite the very best prevention plans, leaks and breakages do occur, as seen in the recent pipeline break at Pearl Harbor. We strongly recommend that other alternatives, including but not limited to, pipeline locations further away from Kanaha Pond Wildlife Sanctuary be evaluated. See Comment OEQC-4

5. According to the Draft EIS, "airport drainage is presently accommodated primarily by natural percolation and sheet runoff into Kalialinui Gulch and adjacent to agricultural lands . . . Kalialinui Gulch is the only ocean outlet for storm water originating on the Airport . . ." Airport runoff generally contains a higher percentage of fuel and oil. Please describe the impacts of polluted runoff on Kalialinui Gulch and the ocean. Please describe the mitigation measures to reduce the amount of oil and fuel from entering Kalialinui Gulch and the ocean. See Comment OEQC-5

6. In section 3.2.1.2 of the EIS, please provide reasons for assuming that all aircraft are Stage 3. See Comment OEQC-6

7. Various parts of the Draft EIS state that, "prior to the construction of these long-range projects additional environmental analysis will be completed in order to determine what, if any, further environmental documentation is required." If this EIS does not fully disclose Phase 3 impacts now, will another Chapter 343, EIS be prepared later? See Comment OEQC-7

8. The airport access roadway and interchange will interfere with a proposed bike route along Hana Highway. Please discuss the mitigation measures to reduce this impact. See Comment OEQC-8

9. What does the Maui County General Plan say about the 9,600 feet runway and the 8,500 parallel runway? See Comment OEQC-9

10. In section 3.2.1.4 of the EIS, please list the specific mitigation measures set forth in the Kahului Airport Noise Compatibility Program. See Comment OEQC-10

11. Who are the "experts" in the travel industry mentioned on page 3-49 of the Draft EIS? See Comment OEQC-11

Should you have any questions, please call Jeyan Thirugnanam at 586-4185. Mahalo.

Sincerely,

Gary Gill
Director

c: Federal Highway Administration
Edward Noda and Associates

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1055

August 20, 1997

TO: GARY GILL, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT OEQC-1 - Discussion of Phase 3 Projects

The various improvement projects proposed for Kahului Airport have been categorized as short-term (Phase 1), medium-term (Phase 2) and long-term (Phase 3). The long-term (Phase 3) projects include the parallel runway, the transient apron, the permanent relocation of helicopter operations, and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks. As stated in Section 1.5.1, these long-range projects are analyzed in this Draft EIS to determine the individual and cumulative impacts as required by HRS Chapter 343 and National Environmental Policy Act (NEPA).

However, given that the construction of these projects will occur, if at all, after the Year 2006, and, more likely near or after the Year 2016, the Draft EIS could only provide an assessment of their foreseeable potential impacts both individually and cumulatively. At this point in time, any more detailed analysis would be highly speculative and prone to error, for it is very likely that each of these long-term projects and

the environs will undergo substantial changes over the next ten to fifteen years. For example, the scope, size, location and timing of the projects may be altered should air travel to and from Maui evolve and take shape differently than originally anticipated.

If and when the parallel runway, transient apron, helicopter facilities and fuel pipeline are defined in detail and submitted as projects to be implemented, each will be subjected to a more in-depth environmental review as required by state and federal law, e.g., Environmental Assessments, Findings Of No Significant Impacts or EIS's.

The fact that the Draft EIS cannot provide a comprehensive environmental review of the long-term projects does not mean that the Draft EIS is deficient. Under NEPA, multi-stage projects such as this one can be "segmented" so long as the portions of the project that are fully analyzed in the Draft EIS meet the following criteria: (i) they have substantial independent utility; (ii) they do not foreclose the opportunity to consider alternatives to the more speculative, long-term projects that will be studied later; and (iii) they do not irretrievably commit federal funds for those projects.

Each of the phases, the short-term (Phase 1), medium-term (Phase 2) projects and long-term (Phase 3) proposed projects for Kahului Airport and analyzed in the Draft EIS meet these three criteria. Each has substantial and independent utility. In fact, even if the Phase 3 projects were never implemented, the Phase 1 and Phase 2 projects would still be necessary and would still serve their intended purposes. The Phase 1 and Phase 2 projects also do not foreclose the opportunity to consider alternatives to the Phase 3 project proposals.

It is anticipated that the design, size, timing, location and need for the parallel runway, transient apron, helicopter facilities and fuel pipeline may change in the next ten to fifteen years. Because the Phase 1 and Phase 2 projects possess their own, self-contained utility, they in no way prevent the consideration of alternatives to the Phase 3 projects.

Lastly, the Phase 1 and Phase 2 projects do not irretrievably commit federal funds for the Phase 3 projects. Indeed, one of the reasons that the Phase 3 projects are speculative is that federal and State of Hawaii, Department of Transportation (HDOT), Airports Division, funding for such airport improvements is not and cannot be guaranteed decades into the future. Because the

Phase 1 and Phase 2 projects are independent of the Phase 3 projects, funding for the former does not commit funding for the latter.

The following information is provided to further clarify this issue.

- The transient apron will be constructed, if at all, after 2006. The parallel runway, long-term relocation of the helicopters, and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks will be constructed, if at all, after the Year 2010.

- The Phase 1 and Phase 2 projects have utility apart from and independent of the parallel runway, transient apron, long-term relocation of the helicopters and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks. Similarly, these Phase 3 projects have independent utility and are not reliant on the implementation of the Phase 1 and Phase 2 projects.

- If and when the time approaches that the parallel runway is required to prevent substantial deterioration of service at Kahului Airport, the Federal Aviation Administration (FAA) will prepare the required environmental documentation pursuant to applicable federal law addressing the proposed runway's environmental effects. Currently, it is anticipated that Kahului Airport will not require the parallel runway, if at all, until the Year 2010. Environmental documentation prepared closer to that time when the parallel runway would actually be constructed ensures that the environmental analysis will be more accurate and relevant.

- In addition, the State of Hawaii, pursuant to HRS Chapter 343, will prepare its own environmental documents for the long-term, Phase 3 projects at a later date closer to the actual implementation of the project. These documents will be either supplemental to this Draft EIS or independent studies. Again deferring study of the future projects to a later date increases the accuracy of the environmental analysis. It is also very likely that this Draft EIS, prepared in 1996, will be considered out of date and unreliable in the Year 2010, thus necessitating the preparation of a new environmental document at that time. Especially, due to the high probability that the long-range actions will change in size, scope, location, or timing.

- According to Council on Environmental Quality (CEQ) regulation 1508.28(b), tiering should be used to, "help the lead agency focus on issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe [emphasis added]." Therefore, the Draft EIS focused on the short-term (Phase 1) and medium-term (Phase 2) projects, and deferred detailed analysis of the Phase 3 projects until a later date when they could be defined with greater precision and when the environmental effects could be determined more reliably and accurately.

- Due to public concern and as required by the Court-ordered stipulation, the Draft EIS also analyzes the impacts of:

  - realigning, widening and improving Alahao Street and extending it to the northeast to Hana Highway as a road open for public use and providing through traffic along the coastal side of Kahului Airport; and

  - international flight operations including permanent and temporary (interim) international facilities. Note, however, that such international arrival facilities is not part of the Proposed Project.

(See attachment "segmentation")

COMMENT OEQC-2 - International Flight Operations

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo

to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT OEQC-3 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation

measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT OEQC-4 - Fuel Pipelines

The potential impacts of the proposed alignment of the pipeline from Kahului Harbor to the Airport Bulk Fuel Tanks, as well as mitigation measures to minimize those impacts, are discussed in the following sections of the Draft EIS: Section 3.4 (Geology, Physiography, Soils, Agricultural Potential and Earthquakes): Section 3.8 (Water Quality); Section 3.10 (Historical, Architectural, Archaeological and Cultural Resources); Section 3.13 (Hydrology Floodplain Management and Drainage): and Section 3.20 (Solid Waste, Hazardous/Toxic Waste and Waste Wash Water).

If and when the fuel pipeline is constructed, it will be installed and operated by the Airline's fuel consortium, the Hawaii Fueling Facilities Corporation. As currently proposed, the pipeline would be aligned on the ocean side (north) of Kanaha Pond. Given this location, there is a potential for a significant impact on Kanaha Pond and coastal water quality should a leak or line break occur. However, the pipeline will be designed to include a "quick flush" system, double walled pipes and leak detection sensors to minimize this risk. The primary purpose of the proposed fuel pipeline is to reduce dependence on the fleet of fuel tanker trucks which currently convey fuel to the Airport from storage facilities at Kahului Harbor. These trucks must travel along Hana Highway, Haleakala Highway, Kala Road and Eena Street to reach the Airport. Once the trucks arrive at the airport, they must carry fuel cargo across Runway 2-20 to reach the air carrier aircraft parking apron adjacent to the passenger terminal. This requires clearance from the FAA Air Traffic Control Tower. It is generally accepted that fuel pipelines provide safer, more environmentally sound fuel conveyance system than that provided by tanker trucks traveling along public roads and across runways.

Due to the long-term, speculative nature of the fuel pipeline from Kahului Harbor to the Airport Storage Tanks, the EIS can only discuss potential impacts of this project in general terms. If and when the pipeline project is considered for construction, additional environmental documentation is required.

COMMENT OEQC-5 - Airport Drainage System

The Airport Drainage System is described in Sections 3.4.2, 3.8.2, and elsewhere in the Draft EIS. As indicated, in the Draft EIS (see Section 3.8.4), best management practices will be used in compliance with State Department of Health rules and regulations and the State's Non-Point Source management Program. Further, new runways, taxiways, and ramp areas will be connected to the drainage catchment system. As necessary, oil/water separators will be installed to minimize the runoff of petroleum products. Equipment wash areas will be equipped with waste wash water collection and appropriate facilities and the new fueling facilities will be bermed and underlain by impermeable membranes to prevent soil and groundwater contamination.

COMMENT OEQC-6 - Stage 3 Aircraft

In accordance with the Airport Noise and Capacity Act of 1990, Congress eliminated the use of Stage 2 aircraft within the contiguous 48 United States by the Year 2000. However, Hawaii and Alaska were exempt from this rule. In addition, FAR Part 36 requirements for aircraft certification are applicable to aircrafts certified after 1977. It is estimated in the FAA's analysis that an aircraft has about a 25 year life cycle and a 30 year useful life. Therefore, by the Year 2010, a great majority of the interisland aircraft will have exceeded the 25 year life cycle or the 30 year useful life and will be replaced by more modern (stage 3) aircraft. In addition, the newer Stage 3 aircraft are more fuel efficient, it is assumed that it will eventually become more economical for the airlines to switch to Stage 3 aircraft.

COMMENT OEQC-7 - Phase 3 Projects

As indicated in the Draft EIS, as required by NEPA and Hawaii Environmental Policy Act (HEPA), appropriate environmental documentation will be prepared for future projects as they are warranted. This documentation may take the form of an EIS or Environmental Assessment, which ever is appropriate at the time. (See attachment "segmentation")

COMMENT OEQC-8 - Airport Access Road/Hana Highway Bikeway

Possible mitigation measures for the potential Airport Access Road and Hana Highway bikeway conflicts are discussed in Section 3.22.8.6 of the Draft EIS. As indicated, there are several

possible solutions to minimize potential conflicts. As the design of the Airport Access Road/Hana Highway intersection progresses, the appropriate measures will be employed and designed into the project.

COMMENT OEQC-9 - Relationship of Maui County General Plan to Proposed Project

The relationship of the Proposed Project to the various State and County goals and objectives is discussed in Section 2.3.1 of the Draft EIS. To our knowledge, the Maui County General Plan does not specifically refer to any runway length or airport facilities, but does support an advanced and environmentally sensitive transportation system which will enable people and goods to move safely, efficiently and economically. As indicated in Section 2.3 of the Draft EIS, the purposes of the Proposed Project are to (1) create an airport infrastructure which will support the present and future goals and objectives of the county and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the Year 2010 in a manner which accommodates existing and forecast aviation demands. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands.

COMMENT OEQC-10 - Kahului Airport Noise Compatibility Program Mitigation Measures

The Kahului Airport Noise Compatibility Program mitigation measures will be listed in the Final EIS per your request.

COMMENT OEQC-11 - Travel Industry Experts

The travel industry experts interviewed are listed in Appendix E to the Draft EIS.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

May 23, 1996
RE: 0673

Mr. Jerry Matsuda
Department of Transportation, Airports Division
Honolulu International Airport
400 Rodgers Boulevard, Suite 700
Honolulu, Hawaii 96819-1880

Mr. Matsuda:

Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements
Kahului, Maui

The State of Hawaii, Department of Transportation, Airports Division (DOT-A), in cooperation with the Federal Aviation Administration (FAA) is proposing improvements at Kahului Airport. The proposed improvements include: extending and strengthening runway 2-20; construction of a parallel runway 2R-20L and related land acquisition; construction of a new airport access roadway; commercial and general aviation facilities; interim helicopter facility; bulk fuel storage facility; other long-range plans including the construction of Phase II of the passenger terminal, international flight operations facilities and long-term helicopter facilities.

This review was completed with the assistance of Kem Lowry, Urban and Regional Planning; Arthur Whistler, Botany; and Tom Hawley, Environmental Center.

General Comments

We appreciate the thoroughness and organization which this draft EIS exhibits. Given the scope and size of the proposed project, there are a wide range of important issues to be discussed and analyzed, and numerous potential impacts to be mitigated. We commend the preparers of the draft EIS for a coherent document in which such information is readily available and easily found. Nevertheless, there are several features which must be treated in greater detail. We have elaborated them below for your reference.

Botanical Survey

Our reviewers found the botanical survey in the draft EIS to be well prepared and to have adequately identified the species in and around the Kahului Airport area. The spelling of species names, however, does need improving. There are numerous errors in the text, which could be the result of typing errors. There are also many mistakes in the checklist prepared by the botanist. These errors must be rectified. See Comment JTH-1

Land Use

Our reviewers appreciate the inclusion of Exhibit 19 in Appendix D, which helpfully summarizes impacts on land uses which could result from the proposed project. The report identified three major potentially adverse impacts on land uses, including the expansion of the Ldn 60 noise area caused by the new parallel runway, the conversion of sugar cane land for airport uses, and the connection of Alahao Street to Old Stable Road and the Hana Highway. Other land uses with potentially adverse impacts include the construction and maintenance of a bulk fuel storage facility and the location of related fuel pipelines. See Comment JTH-2

The portion of the draft EIS which addresses the fuel pipelines and the bulk fuel storage facility warrants considerably more detailed discussion. The document fails to treat the potential impacts and hazards of this system in sufficient detail. Phase One calls for the construction of the storage site, which in turn results in appropriate impact analysis within the draft EIS. Construction of the pipeline, however, is not scheduled until Phase Three of the Kahului Airport Improvements and is thus not scheduled for in-depth analysis until future documentation is prepared. Given the proximity of the proposed pipeline to Kanaha Pond Wildlife Refuge, it is critical to provide information as to the potential effects of the pipeline as early in the planning stage as possible.

Further, Exhibit 19 in Appendix D states that the pipeline will be designed to minimize the risk of rupture and that existing pipelines in the area have not had a history of rupturing. As a result, the draft EIS includes no further mitigation for possible ruptures beyond the design of the pipeline itself. Clearly, minimizing the risk of rupture is not the same as eliminating this risk. Either tsunamis or earthquakes could cause the pipeline to fail. Adequate planning includes preparing for such worst-case scenarios, and it is incumbent upon the preparers of the draft EIS to devise mitigation measures should the pipeline rupture. This is especially important in sensitive areas such as Kanaha Pond, as has been underscored recently by the oil spill in Pearl Harbor. An adequate draft must include appropriate and comprehensive

mitigation measures which address the possibility of pipeline failure.

Segmentation

Our reviewers expressed concern that the improvements planned at Kahului Airport are spread out over such a length of time as to constitute project segmentation. The EIS rules (Title 11, Chapter 200, H.A.R.), specifically prohibit the division of a larger project into smaller portions for environmental review. Under Section 11-200-7 of these rules,

> A group of actions proposed by an agency shall be treated as a single action when:
> (1) The component actions are phases or increments of a larger total undertaking;
> (2) An individual project is a necessary precedent for a larger total undertaking;
> (3) An individual project represents a commitment to a larger project; or
> (4) The actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole.

Because many of the proposed improvements at Kahului Airport are not scheduled for construction until well into the 21st century, they have been placed within the draft EIS into the category of Phase Three actions. Such actions, in turn, are not substantively addressed in this document. Though the draft EIS states that Phase Three actions will be considered during future environmental assessment, we are concerned that this document constitutes a de facto commitment to these actions irrespective of substantive impacts which future assessment may reveal. Phase Three should either be given greater consideration now, or current plans should be scaled back to a more modest, self-contained project.

End of JTH-2

See Comment JTH-3

International Flight Operations

An additional issue raised by our reviewers concerns the extent to which the proposed action at Kahului Airport effectively commits the airport to becoming an international facility. Here again the draft EIS states that internationalization will not occur until Phase Three of the project, thus relegating it to future environmental study. Our reviewers point out, however, that lengthening and strengthening runway 2-20 to 9,600 feet, included as part of Phase One, dramatically increases the capability of Kahului Airport to

handle direct overseas flights. Kahului Airport could effectively become an international airport despite the absence of official facilities which normally accompany internationalization. Given that Phase Three is not assessed in adequate detail in this draft EIS, we are concerned that the proposed action commits Kahului Airport to a scope and breadth of service which has yet to be adequately studied for its impacts. Such a commitment falls under the purview of 11-200-7, H.A.R., and should therefore be addressed in a substantive manner now with the inclusion of appropriate mitigative measures.

Important information which bears on the number of flights which will come into Maui is also not included in the draft EIS. In particular, the *Update of Hawaii Aviation Demand Forecast* was used in the preparation of the draft EIS but does not appear anywhere in the document. In order to review these numbers the public has been provided no alternative but to visit the FAA's offices at Honolulu International Airport. These valuable data are inappropriately omitted and should have been included as an appendix to the draft EIS.

End of JTH-3

Induced Growth

Our reviewers also point out that the proposed action could induce considerable tourist and development growth on Maui, which qualifies as a secondary and cumulative impact under the EIS rules and as such, must be substantively addressed at the draft EIS stage. Section 11-200-17(2) requires assessment of "Significant beneficial and adverse impacts, including cumulative impacts and secondary impacts." With regard to the assertion in the draft EIS that airport improvements do not in and of themselves result in more tourists, it is not adequate to say that hotel room availability definitively regulates visitor capacity on Maui. At present, there is no cap on the number of hotel rooms on Maui. As a result, any increased tourism which airport improvements might bring could be matched by the construction of new hotels.

See Comment JTH-4

The opposite end of this spectrum best illustrates the point. If there were no airport on Maui at all, then fewer tourists would be able to reach the island. The presence of one or several inter-island airports would substantially increase this capacity, and the construction of a major international airport would further enhance Maui's accessibility as a tourism destination. It is incumbent upon the preparers of the draft EIS to recognize and then mitigate for this growth-inducing potential, rather than denying that tourist growth will occur. We call attention to Governor Cayetano's recent comments about direct flights to the Big Island, where he stated that such flights will bring more tourists, more money, and more jobs to

the Big Island. How, then, can the improvements at Kahului Airport be expected to have no effect upon Maui's tourist population?

Apart from visitor industry growth specifically, an increase in Maui's general population as a result of the proposed project must also be considered. The presence of infrastructure clearly impacts the ability of a given area to grow. The above example again applies. If Maui were completely without any infrastructure at all, comparatively few people could live there. Providing more infrastructure, including the ability to fly in and out of Maui from a greater range of destinations and at a greater distance, increases the likelihood of attracting residents. Growth, in short, does not occur in a vacuum. The draft EIS does not adequately address this issue and should include a much more thorough discussion of potential growth-inducing impacts of all phases of the proposed project. End of JTH-4

Alien Species

One area of particularly pressing concern as it relates to the proposed project is the potential introduction of alien species. We are especially concerned that, despite their request, the National Park Service was not included as a cooperating agency for the preparation of the draft EIS. Ample evidence suggests that the possibility of alien species introduction into Maui as a result of the proposed action warranted the inclusion of the National Park Service as a cooperating agency. A letter from the National Biological Survey included in the draft EIS (Appendix A), outlines their concerns regarding alien species introductions. In their words, See Comment JTH-5

> The potential effect of alien species introductions on Maui's agriculture, native biota, and quality of life is so serious that neglect in imposing preventive measures now will appear gravely irresponsible in hindsight.

Of particular concern as it relates to such introductions is the proximity of Haleakala National Park, where vast quantities of Maui's native and endangered species are found.

Given the possible effects of the proposed action on Haleakala National Park, the Environmental Protection Agency urged the Federal Aviation Administration to allow the National Park Service to become a cooperating agency. Their comments, also included in the draft EIS, are germane: See Comment JTH-6

> In keeping with NEPA's spirit of "agency co-

> operation early in the NEPA process" (40 CFR 1501.6), we strongly encourage the FAA to request both the Fish and Wildlife Service (F&WS) and the National Park Service (NPS) to be cooperating agencies, specifically to ensure that the project would afford maximum protection to native species and their habitats. We believe that by enlisting the "special expertise" (40 CFR 1508.26) from both the F&WS and the NPS, the FAA would have the best opportunity to effectively analyze potential project impacts to the surrounding ecosystem and, ideally, to mitigate those impacts to below significance.

Rather than include either the F&WS or the NPS as cooperating agencies, however, the FAA decided to exclude them, partially on the grounds that Haleakala National Park is too far away from Kahului Airport to be significantly impacted by the proposed improvements.

This refusal to include the National Park Service as a cooperating agency in the preparation of the draft EIS exhibits flagrant disregard for the intent of environmental review legislation. The point behind including other agencies for environmental assessment is to prepare the best possible document which most comprehensively addresses potential impacts of the project at hand. In turn, members of the public with an interest in the proposed project benefit from the broadest possible knowledge base for their review of the project. In this case, a substantial and critically important body of information which could have been included in the draft EIS is absent. Not only does this absence run the risk of dramatically impacting Haleakala National Park specifically and Maui's native ecosystem generally, it curtails the public's ability to know precisely what the impacts of alien species introductions to Maui might be. This is an unacceptable abrogation of legally established public review processes. End of JTH-6

Significance of Impacts

Section 1.6 of the draft EIS, "Summary of Impacts and Mitigation Measures," presents a troublingly subjective interpretation of the term "significant." In particular, the draft EIS defines impacts in terms of "significant adverse," "insignificant adverse" and "positive impact." However, it is important to recognize that what may be insignificant to one person may be very significant to anther. An example of this occurs on page 1-14 of the document, wherein land use changes are listed as "significant adverse impacts." Page 1-15 goes on to say, specifically in relation to archaeological resources, that See Comment JTH-7

impacts after mitigation "will be reduced to insignificant." Mitigation measures proposed include surface and sub-surface testing, and data recovery.

Our concern stems from the assumption that simply performing surface and sub-surface testing and data gathering adequately mitigates the loss of an archaeological site. Many people value the presence of archaeological sites precisely because they can still be found in their original locations, rather than in a museum. Others, particularly Native Hawaiians, value archaeological resources as a unique feature of their cultural heritage which must not be disturbed under any circumstances. To simply state that proposed mitigation reduces the impact upon archaeological resources to insignificant is an unacceptable imposition of subjective values upon a process which is designed to retain as much objectivity as possible. We believe it is not the applicant's place to decide what constitutes "significant" or "insignificant" impacts.

End of JTH-7

Summary

Although the present draft EIS represents a second effort on the part of HDOT-A to produce an acceptable EIS for proposed expansion of the Kahului Airport, we are dismayed at the many shortcomings evident in the document. Regrettably, many deficiencies, such as the omission of the crucial *Update of Hawaii Aviation Demand Forecast* and the de facto commitment to future actions, cannot be adequately addressed through revision and incorporation into the final EIS. It is particularly dismaying that perhaps the central community concern raised during litigation on the prior draft EIS, regarding growth-induced and secondary and cumulative impacts, has been completely dismissed as irrelevant.

See Comment JTH-8

As a consequence of these and other deficiencies, we again conclude that the present draft EIS fails to adequately meet the requirements of the EIS rules, and that this document must therefore be withdrawn, revised, and resubmitted once again.

Thank you for the opportunity to comment.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC

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August 20, 1997

Dr. John T. Harrison
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Dear Dr. Harrison:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT JTH-1 - Botanical Survey

Per your request, we will have our botanical consultant review the Botanical Survey Report and the Draft EIS and correct the spelling errors. These corrections and the revised report will be included in the Final EIS. (See attachment "flora")

COMMENT JTH-2 - Land Use, Fuel Pipelines/Fuel Storage

The potential impacts of the proposed alignment of the pipeline from Kahului Harbor to the Airport Bulk Fuel Tanks, as well as mitigation measures to minimize those impacts, are discussed in the following sections of the Draft EIS: Section 3.4 (Geology, Physiography, Soils, Agricultural Potential and Earthquakes), Section 3.8 (Water Quality), Section 3.10 (Historical, Architectural, Archaeological and Cultural Resources),

Section 3.13 (Hydrology Floodplain Management and Drainage), and Section 3.20 (Solid Waste, Hazardous/Toxic Waste and Waste Wash Water).

If and when the fuel pipeline is constructed, it will be installed and operated by the Airlines' fuel consortium, the Hawaii Fueling Facilities Corporation. As currently proposed, the pipeline would be aligned on the ocean side (north) of Kanaha Pond. Given this location, there is a potential for a significant impact on Kanaha Pond and coastal water quality should a leak or line break occur. However, the pipeline will be designed to include a "quick flush" system, double walled pipes, leak detection sensors and will meet applicable federal and state guidelines at the time of construction to minimize this risk.

The primary purpose of the proposed fuel pipeline is to reduce dependency on the fleet of fuel tanker trucks which currently convey fuel to the Airport from storage facilities at Kahului Harbor. These trucks must travel along Hana Highway, Haleakala Highway, Kala Road and Eena Street to reach the Airport. Once the trucks arrive at the Airport, they must carry fuel cargo across Runway 2-20 to reach the air carrier aircraft parking apron adjacent to the passenger terminal. This requires clearance from the Federal Aviation Administration (FAA) Air Traffic Control Tower. It is generally accepted that fuel pipelines provide safer, more environmentally sound fuel conveyance system than that provided by tanker trucks traveling along public roads and across runways.

Due to the long-term, speculative nature of the fuel pipeline from Kahului Harbor to the Airport storage tanks, the EIS can only discuss potential impacts of this project in general terms. If and when the pipeline project is considered for construction, additional environmental documentation is required. However, at this time, we can state that the pipeline and all accessory equipment will be designed to meet seismic and tsunami hazards that may be experienced on Maui in general and specifically the facility location. This information will be included in the Final EIS.

Lastly, in regard to the 1996 fuel line spill in Pearl Harbor, we note that the fuel line that failed was over 40 years old. Present technology and design standards are much more stringent than they were when the failed pipeline was designed and installed.

COMMENT JTH-3 - Segmentation (See attachment "segmentation")

The various improvement projects proposed for Kahului Airport have been categorized as short-term (Phase 1), medium-term (Phase 2) and long-term (Phase 3). The long-term (Phase 3) projects include the parallel runway, the transient apron, the permanent relocation of helicopter operations, and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks. As stated in Section 1.5.1, these long-range projects are analyzed in this Draft EIS to determine the individual and cumulative impacts as required by the Hawaii Environmental Act, Hawaii Revised Statutes (HRS), Chapter 343 and the National Environmental Policy Act (NEPA).

However, given that the construction of these projects will occur, if at all, after the Year 2009, and, more likely near or after the Year 2016, the Draft EIS could only provide general statements regarding their potential impacts both individually and cumulatively. At this point in time, any more detailed analysis would be highly speculative and prone to error, for it is very likely that each of these long-term projects will undergo substantial changes over the next ten to fifteen years. For example, the scope, size, location and timing of the projects may be altered should air travel to and from Maui evolve and take shape differently than originally anticipated.

If and when the parallel runway, transient apron, helicopter facilities and fuel pipeline are defined in detail and submitted as projects to be implemented, each will be subjected to a more in-depth environmental review as required by state and federal law, *e.g.*, Environmental Assessments, Findings Of No Significant Impacts (FONSIs) or EISs.

The fact that the Draft EIS cannot provide a comprehensive environmental review of the long-term projects does not mean that the Draft EIS is deficient. Under NEPA, multi-stage projects such as this one, can be "segmented" as long as the portions of the project that *are* fully analyzed in the Draft EIS meet the following criteria: (i) they have substantial independent utility, (ii) they do not foreclose the opportunity to consider alternatives to the more speculative, long-term projects that will be studied later, and (iii) they do not irretrievably commit federal funds for those projects.

The short-term (Phase 1) and medium-term (Phase 2) projects proposed for Kahului Airport and analyzed in the Draft EIS meet

these three criteria. Each has substantial and independent utility. In fact, even if the Phase 3 projects were never implemented, the Phase 1 and Phase 2 projects would still be necessary and would still serve their intended purposes. The Phase 1 and Phase 2 projects also do not foreclose the opportunity to consider alternatives to the Phase 3 project proposals.

It is anticipated that the design, size, timing, location and need for the parallel runway, transient apron, helicopter facilities and fuel pipeline may change in the next ten to fifteen years. Because the Phase 1 and Phase 2 projects possess their own, self-contained utility, they in no way prevent the consideration of alternatives to the Phase 3 projects.

Lastly, and especially to address your comment that the Draft EIS constitutes a de facto commitment to Phase 3 actions, the Phase 1 and Phase 2 projects do not irretrievably commit federal or state funds for the Phase 3 projects. Indeed, one of the reasons that the Phase 3 projects is speculative is that federal and state funding for such airport improvements is not and cannot be guaranteed decades into the future. Because the Phase 1 and Phase 2 projects are independent of the Phase 3 projects, funding for the former does not commit funding for the latter.

COMMENT JTH-4 - International Flight Operations

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. (See attachment "international flights"). International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in

time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities will needed to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the State of Hawaii Department of Transportation (HDOT) and the FAA. Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project.

Lastly, as indicated in the Draft EIS, direct international flights from Vancouver, British Columbia are already occurring at Kahului Airport. These flights, which are pre-cleared by U.S. Customs in Vancouver, are expected to continue. In response to your comment regarding the Hawaii Aviation Demand Forecast, the forecast information relevant to Kahului Airport is included in the Draft EIS as Tables 1-5 and 1-6. The flight operations for Kahului Airport is discussed in detail in Appendix N of the Draft EIS.

The *Update of Hawaii Aviation Demand Forecast* was "incorporated by reference" and was available for review at the HDOT, Airports Division Offices, and will be made part of the Final EIS. However in regards to your comment, an EIS may incorporate by reference all or portions of another document that is a matter of public record or is generally available to the public. Incorporation by reference is a procedure for reducing the size of EISs and is particularly appropriate for long, descriptive, or technical materials. When a document is incorporated by reference in an EIS, the lead agency must make the document available for inspection at its offices.

Neither HEPA nor NEPA require that incorporated materials be circulated for public review with the EIS, nor do they require circulation or public availability of subsidiary documents that are incorporated in a document that is then incorporated into the EIS. (See attachment "international flights")

COMMENT JTH-5 - Induced Growth

We disagree with your comment that a simple "assertion" was made for the growth inducing impacts, as several analyses on growth

impacts were completed for the Draft EIS. The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-Economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS. A point of clarification, Kahului Airport is not only an interisland Airport, it currently serves numerous scheduled and chartered overseas and international flights.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts), Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts), and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc., beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth. In addition, the Draft EIS states that "Japanese *tourism still represents a fairly small, if*

growing, part of Maui's visitor industry, and virtually all industry experts who were interviewed for the report concluded that initial consequences would be limited to a few flights a week, and these might just be serving the current market."

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project.
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The

SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

Although looking at the opposite end of the spectrum may be ideal, the fact is that Maui has an airport capable of accommodating interisland and overseas aviation demands. In fact Maui has three airports which can accommodate interisland aircraft. The current airport can accommodate the existing and future aircraft used on overseas flights arriving at Kahului.

With regard to your comment that there is no cap on the number of hotel rooms on Maui, there is a moratorium on the issuance of new building permits for additional hotels, which in itself constitutes a de facto cap on the number of hotel rooms on the island. Also, there are approved projects that have not gone forward due to the lack of market demand for additional hotel rooms. As indicated in Section 2 of the Draft EIS, the Proposed Project is in response to forecast aviation activity and passenger levels and it is presumed that as market forces dictate, presently approved projects would move forward and new projects would only be approved when the island's infrastructure has been built-up sufficiently to accommodate additional growth.

The comparison between Maui and the Big Island is like comparing apples to oranges. Maui's tourist activity has consistently been far ahead of the Big Island's, and Big Island hotels are still operating at less than full occupancy. Similarly, the Big Island's unemployment rate has, unfortunately, consistently been far behind Maui's. The increase in tourism on the Big Island has not necessarily created more jobs, but it has increased the number of hours employees are working at existing direct and indirect jobs that have been underemployed for several years.

Lastly, as stated above, we disagree with your statements regarding the adequacy of the analysis on growth, however, your

comments will be made available to the decision maker prior to the final decision on the Proposed Project.

COMMENT JTH-6 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members 'nclude the NPS, FWS, The Nature Conservancy of Hawaii, State and ederal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, the future expansion of domestic or international service will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations, general economic conditions, and the marketing scenarios. These conclusions on the growth impacts are

discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT JTH-7 - Cooperating Agencies

The Cooperating Agency issue is discussed in Section 1.3.3 of the Draft EIS. Additional information is provided below on cooperating agencies and the NPS request for cooperating agency status.

A cooperating agency may be any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to the environmental impacts expected to result from a proposal [40 CFR 1508.5; 1501.6]. An agency has "jurisdiction by law" if it has the authority to approve, veto, or finance all or part of the proposal [40 CFR 1508.15]. An agency has "special expertise" if it has statutory responsibility, agency mission, or related program experience with regard to a proposal [40 CFR 1508.26].

On the lead agency's request any other federal agency with jurisdiction by law or special expertise may be a cooperating agency. In addition, the lead agency may request any other federal agency with special expertise regarding any environmental issue to become a cooperating agency [40 CFR 1501.6]. A lead agency, however, *is not required* to designate an agency as a cooperating agency; rather, any such designation is discretionary.

Although an agency may not be formally designated as a cooperating agency, that agency may still participate extensively in the environmental review process by participating in the scoping process, developing information to be reviewed and, at the lead agency's discretion, included in the EIS, providing staff support in the EIS's preparation, and requesting a meeting with the lead agency to discuss the agency's concerns [40 CFR 1501.6].

The NPS requested that it be designated as a cooperating agency for purposes of preparation of the EIS for the proposed improvement projects. Although the NPS was not formally designated as a cooperating agency, the FAA and the HDOT used the nvironmental analysis and proposals from the NPS to the maximum extent possible in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

As indicated above in the response to Comment JTH-6, the NPS has been an active participant in the preparation of the Alien Species Biological Assessment that will be included in the Final EIS. The FAA and HDOT, Airports Division, included the NPS as members of a Biological Assessment Technical Panel that provided key information and guidance to the FAA and HDOT, Airports Division, during the preparation of the Alien Species Biological Assessment. We, too, value the NPS expertise and are appreciative of the information they have provided regarding the alien species issue and potential impacts to Haleakala National

Park as a result of the potential increase in the introduction of alien species.

Currently, the U.S. Fish and Wildlife Service has an Memorandum of Understanding with the U.S. Department of Transportation for early consultation (since 1995) on environmental impact statements. Therefore, early consultation with U.S. Fish and Wildlife Service did occur from the early stages of the EIS on endangered species and wetlands.

COMMENT JTH-8 - Significance of Impacts

The tables of significance in Section 1.0 are general summaries of the significance criteria. A detailed discussion of the significance criteria is included in Section 3.0 of the Draft EIS. We agree that the definition of the significance of potential impacts resulting from any project can be rather subjective. In an effort to remove as much subjectivity from these definitions we tied significance into existing rules, regulations, laws, and statutes where they applied. Similarly, for each environmental issue we defined what we considered to be significant, insignificant, etc. This was done to remove any misunderstandings regarding our evaluations and determinations of significance.

Your comment letter cites our determination of significance relative to archaeological resources. The determinations regarding significance and mitigation measures to minimize or eliminate significantly adverse impacts, are directly related to the applicable federal and state laws, statutes, rules, and regulations. We fully realize that some may not agree with those regulations, but we are, by law, compelled to follow the regulations in effect at the time the EIS is prepared. Should those regulations change between preparation of the Final EIS and actual construction, we will follow the changed regulations.

COMMENT JTH-9 - Summary

The responses above address all of the issues that you believe to be omitted from the Draft EIS. As indicated above, portions of the aviation forecasts relevant to the Kahului Airport are included in the Draft EIS. The Proposed Project is not a de facto commitment to future actions, and considerable effort has been expended to address the perceived growth inducing factors of the Proposed Project. We adamantly disagree with the statement that we have dismissed any issue as irrelevant. We have carefully considered each environmental issue area raised by the

community, the courts, affected agencies, and our own consultants. The mere fact that one does not agree with the conclusions of the studies we have conducted, does not mean that an issue has not been adequately addressed.

The *Update of Hawaii Aviation Demand Forecast* was incorporated by reference. (See response to Comment-JTH-4, above)

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
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STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

May 21, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

LOG NO: 17538
DOC NO: 9605KD27

Dear Mr. Welhouse:

SUBJECT: National Historic Preservation Act, Section 106 Review of the Draft Environmental Impact Statement - Kahului Airport Improvements Project, Kahului, Wailuku District, Island of Maui TMK: 3-8-01

The Draft Environmental Impact Statement (DEIS) for the Kahului Airport improvements project covers an area of approximately 1,447 acres and addresses impacts for twenty-five proposed construction/improvement projects that are to occur in three phases. In order to address the impacts of these projects to historic and archaeological sites, an assessment report was prepared and attached to the DEIS as Appendix H (*The Archaeology of Kahului Airport*, M.J. Tomonari-Tuggle and D.J. Welch 1995).

The assessment report summarizes previous land use in and around the airport area, and summarizes the findings of previous archaeological studies. The assessment also includes new information regarding the Naval Air Station, Kahului (NASKA; SIHP Site 50-50-05-4197). The recommendations for "no adverse effect" are organized in the assessment by airport subarea (i.e., airport proper, coastal strip, cane fields, developed lands to the west, and Kanaha Pond). Specific recommendations are also provided for previously identified historic sites.

We would like to first comment on the potential impacts and recommended treatments for the known historic sites. Second, we will comment on recommended additional inventory surveys of previously unsurveyed areas within the project. Third, we wish to point out some inconsistencies between the text of the assessment report (Appendix H) and the text of the DEIS regarding site assessments and recommended actions (Pages 2-82-87). Finally, we will summarize additional archaeological work that is recommended prior to the completion of the Final EIS for this project.

RECEIVED
MAY 30 1996
EDWARD K. NODA & ASSOCIATES

Known Historic Sites

Prior archaeological surveys within portions of the airport have identified five historic sites. SIHP Site 50-50-05-1777 is a buried cultural deposit which includes intact features, midden deposits and numerous artifacts. The site has been dated to circa AD 1380-1700. Site 1777 is located within the area slated for Phase 2 land acquisition at the east end of a proposed parallel runway. The site was identified during monitoring of a sewer trench excavation that was not related to airport improvements. The area around Site 1777 was not included in previous inventory surveys that have been conducted for airport projects. The assessment report notes that our office has previously indicated that this area will require subsurface testing prior to grubbing, grading, or construction in this area. Data recovery work at Site 1777 will also be needed. We will not know the full extent of cultural resources in this area until the subsurface survey work is completed. The EIS should therefore state that the DOT cannot address potential impacts to historic sites in this area until further archaeological work is completed.

SIHP Site 50-50-05-1798 consists of an unknown number of human burials, a reburial area, and a subsurface terrace wall with associated pondfield deposits. The full extent of Site 1798 is not known; it was first identified during grading for runway construction in 1975. At that time, human skeletal remains were disturbed and exposed. Some of the remains were preserved in place, others were reburied nearby. It is possible that the site extends beneath runways 5/23 and 5/20; no survey was conducted of this area prior to runway construction.

See Comment DLNR-1

Additional subsurface testing and data recovery is recommended in the assessment report for the pondfield and wall feature within Site 1798. We concur with this recommendation, and also recommend that additional testing also be conducted in order to determine more accurately the extent of burials and human skeletal remains at this site.

See Comment DLNR-2

The assessment report recommends preservation "as is" for the known burials at Site 1798, with the placement of a 50 foot buffer zone around the *in situ* burials and a 30 foot buffer around the reburial area. The proposed burial treatment/preservation plan as presented in the assessment report will need to be reviewed by the State Historic Preservation Division Burial Sites Program, and if the burials are Hawaiian, the Maui/Lana'i Island Burial Council will make the determination as to whether they are to be preserved in place or relocated (HRS 6E). The Department of Transportation should request Council determination prior to the finalization of the EIS, as the final disposition of this site may affect the placement of proposed structures and facilities. The additional archaeological testing to determine the extent of the burials should be conducted prior to Council determination.

See Comment DLNR-3

The known features of Site 1798 are located at the site of a proposed transient aircraft parking apron and additional air cargo facilities, to be constructed during Phase 2 improvements. It should also be noted that the proposed strengthening and repaving of Runway 2-20 (Phase 1) could potentially have an adverse effect on unidentified burials associated with Site 1798. This potential impact is not discussed in the assessment report or in the DEIS. Moreover, Welch (1991, Appendix H) reports that fill material used by the military in this area of the airport contained human skeletal material. If this is correct, then there will need to be a plan in place for recovering these remains when the existing runway pavement is removed.

SIHP Site 50-50-05-1799 is a 4.0 m long alignment and possible coral paving of unknown function, located north of Site 1798. This site appears to be within the impact zone for a proposed perimeter road and fencing, which is included as part of the Phase 2/3 improvements. A full assessment of this site is not possible based on currently available information. The assessment report recommends that additional archaeological work is needed here if construction activities are to occur within the immediate site area. We recommend that testing is needed to determine the function of the site as part of the planning process. See Comment DLNR-4

SIHP Site 50-50-05-2849 consists of an extensive subsurface cultural deposit that was identified in ten backhoe trenches excavated during a prior testing project for the airport (Toenjes et al. 1991). The site will be impacted by the proposed perimeter road and fencing, and by widening of the runway safety areas. The assessment report recommends that data recovery work including both backhoe trenching and hand excavation be conducted at this site prior to the initiation of earth disturbance in the area. We concur with this recommendation. Information obtained during inventory survey at this site indicates that it is significant for information content. Based on current information, data recovery of impacted areas will permit a "no adverse effect" determination for this site.

SIHP Site 50-50-05-4197 consists of numerous structures, cement pads, roadways, aircraft, surface artifacts, and adjunct features which comprise the Naval Air Station. The assessment report provides preliminary information for a number of these buildings, and indicates that there are available documents and maps to aid in the identification of various features. A more detailed inventory and assessment of this site is needed for the Final EIS. There appear to be some structures within this site that may be architecturally significant. The assessment report recommends that a sample of the structural foundations should be recorded in detail by an architectural historian as part of the data recovery work. We believe that an inventory survey of the site should be conducted, with site assessments by an architectural historian, in order to determine whether selected buildings should be preserved. At this time, we do not have sufficient information to determine the extent, nature, and location of data recovery work that is needed for this site. See Comment DLNR-5

Kanaha Pond (SIHP Site 50-50-05-1783) is within the airport project areas boundaries, however, no improvements are proposed for the pond area. We recommend that this historic fishpond remain as a preserve, and that no construction work occur within or adjacent to its boundaries. The site is significant under all four National Register Criteria, and is also significant under HRHP criterion E, as having traditional cultural value.

Areas Not Previously Surveyed

The archaeological assessment report recommends that subsurface inventory survey work should be conducted of all areas within the existing airport grounds that have been filled (as opposed to cut). We concur with this recommendation. These areas occur along both sides of runways 5/23 and 2/20, and the area west of runway 17/35. In addition, all structural remains and other components of the Naval Air Station within the airport grounds should be recorded, and locations accurately plotted in order to determine whether they will be impacted by the proposed projects. The significance of the structures will need to be assessed, and mitigation measures recommended. See Comment DLNR-6

The area of cane fields to the east and southwest of the existing airport will be impacted by Phase I infrastructure improvements and runway 2/20 extension. The assessment report and early twentieth century maps of the area indicates that four plantation camps were once present in these areas (Middle Village 1, Lower Village 1, Japanese Village 1 and Russian Village). There is a potential for subsurface features to be present in the area of these villages, beneath the disturbed plowzone. We concur with the recommendation that subsurface inventory survey work occur in the areas of the plantation camps. The testing should occur prior to completion of the final EIS, in order to provide information on the presence/absence of potentially significant sites that may be impacted by Phase I improvements.

The area to the west of the airport, between Kanaha Pond and Kalialinui Gulch will be impacted by an underground fuel pipeline, construction of fuel storage tanks, and expanded transportation facilities. The assessment report recommends that subsurface testing and sediment coring be conducted for proposed projects in this area. We concur with this recommendation. The fuel pipeline is listed in the DEIS as Phase 2/3 project. Inventory level recording and National Register evaluations will also be needed for the NASKA (Site 4187) features within this area.

The assessment report indicates that inventory survey work has been conducted of areas to the northeast and southeast of Kanaha Beach Park, and at the mouth of Kalialinui Stream. No archaeological work has been conducted to date within Kanaha Park. The DEIS indicates that improvements to Kanaha Park are to occur as part of the airport improvement project. The location of the park improvement area as shown on Figure 2-12 is within a previously surveyed and tested area. If the improvements remain in this area, they will have "no effect" on historic sites. If, however, improvements occur within the existing park area, impacts to unidentified sites could occur. Any areas to be impacted by park improvements within the park proper will need to have archaeological inventory work completed prior to initiation of earthmoving or vegetation grubbing.

The Draft EIS

It is stated on page 3-82 of the DEIS that the NASKA structures "...contain no special architectural features and are not considered architecturally significant." This statement is repeated on page 3-87. In contrast, the assessment report (Appendix H) clearly states that:

> The standing structures and foundations should be considered potentially significant and eligible for the National Register. Buildings 101, 244 and the remaining foundation of Building 411 should be considered for preservation. (Appendix H, page 57)

Site 4187 is significant under NRHP Criteria A and D, and certain structures are potentially significant as excellent examples of an architectural style and period (Criterion C). The EIS text should be modified to more accurately reflect this finding. As indicated above, additional inventory and assessment work is needed at this site for Final EIS preparation.

Table 3-36 of the DEIS describes a portion of Site 1798 as a "disturbed burial area"; proposed treatments are "avoid or data recovery and institute burial plan". It should be clarified that Site 1798 contains known *in situ* burials that were preserved in place, and are described in the assessment report as "undisturbed burials". The proposed treatment for this site should follow the procedure outlined above,

which is mandated by HRS Chapter 6E. This includes the following steps: 1) determine the extent of the burials, 2) develop a burial treatment plan, 3) petition the Maui/Lana'i Islands Burial Council for a determination to preserve in place or relocate, 4) and have the burial treatment plan approved by the State Historic Preservation Division Burial Sites Program. Data recovery would occur only if the Council determines that the burials should be relocated.

Regarding project impacts, it is stated on page 3-86 of the DEIS:

> Based on the archaeological surveys and determination analyses performed for this EIS, and based on evaluation criteria listed above, the Runway 2-20 extension and the other Proposed Projects in Phase 1 will not have significant impacts on the archaeological, cultural and historical features.

We cannot fully concur with this conclusion at this time. As stated above, the construction work associated with strengthening Runway 2-20 could adversely affect Site 1798. Additional subsurface testing is needed in this area to determine the extent of the burial site. Other phase 1 work, such as improvements to infrastructure (roadways and utilities) could also impact historic sites. The specific location of these improvements is difficult to ascertain from available maps and text.

Table 3-37 (page 3-86) of the DEIS has the headings in the wrong order. The heading "Significance Criteria" should be over the first column; the heading "Potential Effect Issue Area" should be over the second column. We do not agree with the table for Criteria A and C, which has "Insignificant (none)" and "Not Applicable" entered in the third column. Both of these criteria may be applicable to the NASKA, as well as other sites that may be present within unsurveyed areas. It is premature to make these kinds of conclusions regarding project impacts; the full significance of sites in the project area has not been determined.

Regarding mitigation measures, the DEIS states that "additional data recovery and recording will be performed for all sites..."(page 3-87). Prior to the initiation of data recovery, inventory level work is needed for NASKA (Site 4197), for Site 1777 and immediate area, for Site 1798 and immediate area and for Site 1799. Data recovery level work may proceed at Site 2849. Suitable mitigation measures for the other four sites cannot be determined until the inventory level work is completed. In some cases, data recovery may not be the appropriate mitigation measure.

The DEIS states on page 1-5 that the 1991 Court-ordered stipulation required the EIS to address projects described in the Long-Term Development Plan; however, it is stated on page 3-86-87 that impacts of the Phase 3 improvements will be addressed in future environmental documents. It is therefore not clear which specific future improvements are to be addressed in this DEIS. The list of projects on page 1-12 does not distinguish the Phase 2 from Phase 3 projects.

Summary

Additional archaeological inventory work is recommended for the Naval Air Station and for Site 1798 prior to finalization of the EIS. In addition, it would be preferable to have a burial treatment plan

approved and in place, so that project plans reflect the final disposition of Site 1798. A monitoring plan is also needed for work to be conducted along, under or near the runways in the areas of Site 1798.

All areas of the cane fields, the area west of the airport, and the immediate airport area that are to be impacted by Phase 1 improvements should have inventory level work completed for the Final EIS. As stated above, the specific locations of these areas, particularly the infrastructure improvements, are not clearly identified in the DEIS.

A data recovery plan for Site 2849, and a plan for additional inventory survey work in areas discussed above should be included in the Final EIS, if the additional survey is not completed prior to EIS finalization.

It would be preferable to address effects of the phase 2/3 projects, such as the perimeter fence and road, air cargo facilities, transient aircraft parking apron, widening of runway safety areas, and land acquisitions as early as possible in the planning process. It appears that certain of these project are to be addressed in the current EIS. For these projects, inventory level work should be completed for the final EIS.

Aloha,

DON HIBBARD, Deputy
State Historic Preservation Officer

KD:jen

cc: OEQC
Dept. of Transportation, Airports Division (Owen Miyamoto)
Edward Noda and Associates (615 Piikoi St., Suite 300, Honolulu 96814)

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

IN REPLY REFER TO
AIR-EN
97.908

August 20, 1997

TO: DON HIBBARD, DEPUTY
STATE HISTORIC PRESERVATION OFFICER
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 21, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DLNR-1 - Known Historic Sites

Thank you for your concurrence with the Draft EIS recommendation regarding additional subsurface testing and data recovery for the pond field feature and wall within Site 1798. Per your request, additional testing will be conducted to determine more accurately the extent of burials and human skeletal remains at this site.

COMMENT DLNR-2 - Preservation Plan

The Hawaii Department of Transportation (HDOT), Airports Division, has submitted a completed Preservation Plan to the State Historic Preservation Office (SHPO). In addition, the Federal Aviation Administration and the SHPO have entered into a programmatic agreement with HDOT, Airports Division, and the Maui/Lanai Island Burial Council for the proposed project.

COMMENT DLNR-3 - Inadvertent Discovery of Burials Under Runway

As indicated in the Draft EIS (see Section 3.10) a consulting archaeologist will be on call during construction activities. Should previously undiscovered burials or other features be unearthed during construction, appropriate steps will be taken to minimize the disturbance of the site or loss of data.

COMMENT DLNR-4 - SIHP Site 50-50-05-1799

The recommended testing will be performed prior to construction of the perimeter fence per the programmatic agreement. Per State rules and regulations, a report will be filed with your office for approval prior to construction.

COMMENT DLNR-5 - SHIP Site 50-50-05-4197

The recommended additional survey work and determinations will be made per the programmatic agreement prior to construction occurring within the site area.

COMMENT DLNR-6 - Areas Not Previously Surveyed

The additional surveys as per the programmatic agreement will be conducted prior to construction activities. Reports generated as a result of these surveys will be submitted to your office for review and approval.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1853

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to

June 12, 1996

91-345C/epo

To: The Honorable Benjamin Cayetano
Governor, State of Hawaii
c/o Director, Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

From: Lawrence Miike
Director of Health

Subject: Draft Environmental Impact Statement (DEIS)
Kahului Airport Improvements
Kahului, Maui, Hawaii
TMK: 3-8-01 and 3-8-79

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer, in addition to our previous comments on this project, dated November 21, 1991 and November 2, 1992 (enclosed).

Clean Air Branch

The Department of Transportation, Airports Division and the Federal Aviation Administration (FAA) has submitted a DEIS to the Department of Health for the proposed Kahului Airport Improvements Project. The project is the result of the amended Kahului Airport Master Plan which incorporated updated guidelines in addressing proposed development of the Kahului Airport through the year 2010.

Some of the proposed projects addressed by the DEIS include:

1. extending and strengthening of Runway 2-20;

2. constructing a parallel runway (Runway 2R-20L) and associated taxiways;

3. constructing a new airport access road as well as new commercial and general aviation facilities; and

4. proceeding with certain related improvements and actions, of which many were included in the 1989 Kahului Airport Development Plan.

Projects associated with the development of the Kahului Airport would proceed in accordance to a three phased development plan that was presented in the Master Plan. Phase I of the Master Plan refer to projects that are part of the recommended airport development as well as projects that are presently in progress or have been completed. Phases II and III of the Master Plan refer to future projects incorporated in the Long-term Development Plan for the airport. In addition, if any of these projects include potential impacts that were not previously anticipated in the EIS, they would be reanalyzed and, if needed, request additional information prior to commencing work.

Control of Fugitive Dust: See Comment DOH-1

There is a significant potential for fugitive dust emissions during all phases of project development. This would be especially significant during construction of the parallel runway due to the large amount of earthmoving activities required. Therefore, implementation of adequate dust control measures during all phases of construction is warranted. Construction activities must comply with provisions of Chapter 11-60.1, Hawaii Administrative Rules, section 11-60.1-33 on Fugitive Dust.

The contractor should provide adequate means to control dust from road areas and during the various phases of construction activities. These means include, but are not limited to:

1. focusing on minimizing the amount of dust generating materials and activities, centralizing material transfer points and onsite vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

2. providing an adequate water source at the site, prior to startup of construction activities;

3. landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

4. control of dust from shoulders, project entrances, and access roads; and

5. providing adequate dust control measures during weekends, after hours, and prior to daily startup of construction activities.

91-345C

Should you have any questions on this matter, please call Mr. Timothy Carvalho of the Clean Air Branch at 586-4200.

Underground Storage Tanks (USTs) | See Comment DOH-2

Although none were specifically indicated in the DEIS, it is possible that new USTs may be installed at the Kahului Airport for storage of motor fuel, generator fuel, etc. The applicant should be aware that UST installations are subject to federal (40 CFR 280) and state (HAR 11-64, under development) technical standards and financial responsibility requirements for USTs. Owners of newly installed USTs must notify the Department of Health's Underground Storage Tank Section of the existence of such USTs within 30 days of installation. Also, permits must be obtained from the applicable building and fire safety authorities before installation of any USTs.

The DEIS indicated that USTs are or were present at two known facilities in the project area which will be impacted by the proposed action. Our records indicate the presence of several UST facilities in the Kahului Airport area (see attached list). In addition to these facilities, there may have been USTs at other existing or previous facilities in the project area for which we do not have records. If subsurface contamination originating from releases from these or other USTs is discovered, the applicant should note that the Department of Health's Underground Storage Tank Section of the Solid and Hazardous Waste Branch has developed a detailed *Technical Guidance Manual for Underground Storage Tank Closure and Release Response* (August 1992) to assist responsible parties and their consultants and contractors in complying with the federal UST closure requirements and release response requirements as found in 40 CFR 280.

Should you have any questions regarding these comments, please contact Eric Sadoyama of the Solid and Hazardous Waste Branch, Underground Storage Tank Section at 586-4226.

Attachment

c: Edward K. Noda and Associates, Inc.
DOT, Airport Division ✓
CAB
SHWB

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
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Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
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HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.817

August 20, 1997

TO: DR. LAWRENCE MIIKE, DIRECTOR
DEPARTMENT OF HEALTH

FROM: KAZU HAYASHIDA KH
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of June 12, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DOH-1 - Control of Fugitive Dust

The control of fugitive dust during construction is discussed in Section 3.7.4 of the Draft EIS. As indicated, a fugitive dust control plan will be prepared by the construction contractor(s) prior to construction. The measures identified in the Draft EIS, as well as those in your memorandum, will be listed in the construction contract specifications as being required in the fugitive dust control plan.

COMMENT DOH-2 - Underground Storage Tanks (USTs)

At present, we do not foresee the requirement to install underground storage tanks as part of the Proposed Project. However, should this situation change, all installations will comply with applicable Federal and State UST rules and regulations. Similarly, should existing USTs be discovered during construction of the Proposed Project, their removal will be guided by all applicable Federal and State rules and regulations.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

BENJAMIN J. CAYETANO
Governor

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

JAMES J. NAKATANI
Chairperson, Board of Agriculture

LETITIA N. UYEHARA
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MAY 30 1996

May 24, 1996

Federal Aviation Administration
Airports District Office
P. O. Box 50244
Honolulu, Hawaii 96850-0001

Attention: David J. Welhouse

Dear Mr. Welhouse:

Subject: Draft Environmental Impact Statement (DEIS)
Kahului Airport Improvements
Kahului, Maui
State Project No. AM1011-07

The State Department of Agriculture (SDOA) has reviewed the subject document and offers the following comments.

Air Cargo] See Comment DOA-1

We concur with the air cargo analysis found in the DEIS (Volume III, Appendix E, Section 4.7, pages 4-83 to 4-86). As the agricultural industry on Maui and throughout Hawaii continues to shift towards higher-value diversified crops, increased available capacity and frequency of air cargo out of Hawaii to mainland and foreign destinations will become more critical in the future. The proposed improvements to the Kahului airport will help in this regard.

To assist agricultural businesses make effective and efficient use of increased transportation opportunities like what will come from the Kahului airport improvements, the Department is planning to create a working committee that will address in a comprehensive and systematic manner the overall transportation issue faced by our agricultural producers. This suggests the incorporation of post-harvest, treatment, and storage facilities as part of an integrated approach to agricultural cargo transportation planning and program implementation.

At the appropriate time, we will advise the State Department of Transportation (SDOT) to consider specific cargo facility improvements that would benefit the shipment of agricultural products, such as covered storage of agricultural produce awaiting shipment, as well as improvements to facilitate the Department's alien species interception/inspection program.

Alien Species] See Comment DOA-2

Kahului airport is the major gateway on Maui island for any introduction of harmful alien species, including injurious insects, plant diseases, pests, and unwanted/illegal animals. Improvements to the airport which increases its capacity and accessibility will mean an increase in the introduction of harmful alien species at a rate we suspect will be considerably greater than if there were to be no improvements. The most effective way to prevent alien species introduction is to strengthen the Department's interception/inspection program because the cost of control and eradication of alien species once out in the Hawaii environment is high.

Contrary to what is stated in the DEIS, it is unreasonable to associate or compare the existing Statewide alien species introduction problem with the problems to be

encountered at Kahului airport because preventive resources such as manpower and facilities are not the same at each port of entry.

When the number of aircraft arrivals and passenger/cargo volume increase because of the airport improvements, present SDOA staff resources at Kahului airport will not be able to maintain monitoring and inspecting aircraft arrivals and passenger/baggage surveillance to current standards. To accommodate any increases in aircraft arrivals, and concomitant increases in passenger and cargo volume, sufficient additional manpower and support facilities and equipment would be required. This will be an issue that the Department must resolve and would benefit from the assistance of SDOT to ensure that cargo/passenger/baggage areas and facilities are located and designed to help the alien species interception/inspection program.

Should you have any questions, please contact me at 973-9551, or Earl Yamamoto at 973-9466. Thank you for the opportunity to comment.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

c: Dr. Lyle Wong, Administrator, Plant Industry Division
Samuel Camp, Acting Administrator, Marketing Division

aSecarg.e51

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.967

August 20, 1997

TO: JAMES J. NAKATANI, CHAIRPERSON
BOARD OF AGRICULTURE
DEPARTMENT OF AGRICULTURE

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 24, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comment which are attached for reference.

COMMENT DOA-1 - Air Cargo

As you may be aware, the Hawaii Department of Transportation (HDOT), Airports Division, has been working with representatives from the Department of Agriculture (DOA), as well as other state and federal agencies and private groups regarding the alien species issue. HDOT, Airports Division, is committed to working with DOA on the design and construction of a new air cargo building at Kahului Airport that will include the equipment, offices and facilities required by DOA to, not only help control alien species introductions, but also to assist in the development of Hawaii's and Maui's agricultural industry. This information will be included in the Final EIS.

COMMENT DOA-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP)

Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, DOA, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS.

One of the alien species mitigation measures to be included as part of the Proposed Project will be HDOT, Airports Division, providing funding for another DOA inspector at Kahului Airport. This is in addition to the design and construction of the air cargo facility noted in the response for Comment DOA-1, above. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1541

BENJAMIN J. CAYETANO
GOVERNOR

ROY S. OSHIRO
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587 0600

IN REPLY REFER TO
96:PPE/1898

May 17, 1996

TO: The Honorable Benjamin J. Cayetano, Governor
c/o Office of Environmental Quality Control

FROM: Roy S. Oshiro
Executive Director

SUBJECT: Draft Environmental Impact Statement for Kahului Airport Improvements

We have reviewed the subject EIS and offer the following comments.

We note the recommended noise abatement measure of negotiating or offering to purchase private properties in West Spreckelsville which are impacted by noise contours. As HFDC has oversight responsibility for statewide relocation programs pursuant to Chapter 111, HRS, we ask that you submit a copy of the relocation plan for our review should the preferred alternative be taken. See Comment HFDC-1

Thank you for the opportunity to comment.

c: DOT, Airports Division
Edward K. Noda and Associates, Inc.

HFDC

BENJAMIN J CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.968

August 20, 1997

TO: ROY OSHIRO, EXECUTIVE DIRECTOR
HOUSING FINANCE AND DEVELOPMENT CORPORATION
DEPARTMENT OF BUDGET AND FINANCE

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

Subject: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 17, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT HFDC-1 - Housing Relocation Plan

The Department of Transportation, Airports Division, will continue to keep your office informed of any relocation planned as a result of the Proposed Project. This will include providing your office with a copy of the Relocation Plan as it is developed.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD V. RICHARDSON
DIRECTOR OF CIVIL DEFENSE

ROY C. PRICE, SR.
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

May 21, 1996

RECEIVED
MAY 23 1996
EDWARD K. NODA & ASSOCIATES

TO: Mr. David J. Welhouse
Airports District Office
Federal Aviation Administration

FROM: Roy C. Price, Sr.
Vice Director of Civil Defense

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS), KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI, HAWAII

We appreciate this opportunity to comment on the DEIS for the Kahului Airport Improvements Project, Kahului, District of Wailuku, island of Maui, Hawaii; TMK: 3-8-01 and 3-8-79.

The Kahului Airport area currently has the necessary sirens in place and the requirements for additional alerting and warning devices do not appear to be affected by the proposed improvements. However, if an existing siren needs to be moved or re-sited for any reason as a result of the proposed improvements, we request that the person listed below is contacted. Communications in disasters as well as in day-to-day operations is essential for the public welfare and safety. Therefore, State Civil Defense (SCD) requests that a fully integrated airport radio system be in place to handle contingencies when the improvements are completed. Emergency services such as aircraft rescue and firefighting (ARFF), airport security, civil defense, emergency medical services, fire, and police etc., should be considered for inclusion on the net. Specific communication procedures should be coordinated and included in the airport operations plan. This integrated radio

See Comment DOD-1

See Comment DOD-2

system should be coordinated with the appropriate State, county and private agencies on Maui.

If there are any further questions, please have your staff call Mr. Mel Nishihara of my staff at 733-4300.

bc: Edward K. Noda and Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1106

August 20, 1997

TO: ROY C. PRICE, SR., VICE DIRECTOR
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
DEPARTMENT OF DEFENSE

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIPRORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 21, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DOD-1 - Airport Siren System

Should an existing civil defense siren require relocation or a new siren installed at Kahului Airport, your office will be contacted as requested.

COMMENT DOD-2 - Integrated Airport Radio System

A fully integrated airport radio system will be in place at Kahului Airport for emergency and civil defense purposes. Specific communication coordination procedures will be developed by the Airport Manager and coordinated with your office.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1292

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

May 7, 1996

The Honorable Benjamin J. Cayetano
Governor, State of Hawai'i
c/o Office of Environmental
Quality Control
220 South King Street, 4th Floor
Honolulu, Hawai'i 96813

Mr. David J. Welhouse
U.S. Department of Transportation
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawai'i 96850-0001

Dear Governor Cayetano and Mr. Welhouse:

Subject: Kahului Airport Improvements - Draft Environmental Impact Statement

We have reviewed the Kahului Airports Improvements Draft Environmental Impact Statement (DEIS) transmitted by letter dated April 1, 1996 from the Federal Aviation Administration, and have the following comments to offer:

1) We confirm that the lands within the Kahului Airport Boundaries includes lands that are within the State Land Use Conservation, Agricultural and Urban Districts.

2) Figures 3-14 and 3-15 of the DEIS approximately shows the current State Land Use Districts in the immediate area of Kahului Airport.

3) We note that on page 3-25 of the DEIS, paragraph 3, it is stated that the Office of State Planning has proposed reclassification of approximately 210 acres of lands owned by the State of Hawaii from the Agricultural District to the Urban District for lengthening of Runway 2-20 and having improvements

See Comment EU-1

located in the vicinity of the East Ramp (FAA control tower, etc.) placed into the proper district.

The Office of State Planning made this recommendation in its 1992 State Land Use District Five-Year Boundary Review for the Island of Maui.

The DEIS should also include that the State of Hawaii, Department of Transportation - Airports Division, has filed a Petition for District Boundary Amendment with the Land Use Commission for reclassification of the approximately 210 acres recommended by the Office of State Planning in the Five-Year Boundary Review Report.

We note that page 11 of the Land Use Impact Assessment (Appendix D) of the DEIS states that the petition has been filed with the Commission.

4) The petition for reclassification of approximately 210 acres is currently pending before the Commission.

The Commission continued hearings on the petition until the Petitioner supplements the record with the filing of a joint Federal/State EIS pursuant to the Stipulation and Order granted by the Second Circuit Court (Civil No. 92-0698(1)).

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on this matter.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: Mr. Owen Miyamoto
Edward K. Noda and Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
669 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.1229

August 2, 1997

TO: ESTHER UEDA, EXECUTIVE OFFICER
LAND USE COMMISSION
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 7, 1996 on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT EU-1 - Office of State Planning

Your comment has been incorporated into the Final EIS as shown on the attachment.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

Attachment "Land Use"

Change to Section 3.3.2

Presently, the Office of State Planning has proposed reclassification of 210 acres of State of Hawaii lands from Agriculture to Urban in support of the airport expansion, specifically for the lengthening of Runway 2-20[1]. In addition, the County will need to change the zoning of the acquired land from Agriculture and Single Family to Airport as the need for airport facilities become apparent. The HDOT-AIR has filed a petition for district boundary amendment with the Land Use Commission for the reclassification of approximately 210 acres as recommended by the Office of State Planning (currently known as DBEDT, Office of Planning) in the five (5)-year Boundary Review Report.

[1] This land use reclassification was part of the 1992 State Land Use District five (5) year Boundary Review for the Island of Maui.

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

MAY 28 1996

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOSIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

May 23, 1996

MEMORANDUM

TO: The Honorable Benjamin J. Cayetano
Governor, State of Hawaii
c/o Office of Environmental Quality Control

FROM: Kali Watson, Chairman
Hawaiian Homes Commission

SUBJECT: KAHULUI AIRPORT IMPROVEMENTS: Draft EIS of March 1996

The Department of Hawaiian Home Lands (DHHL) submits the following comments regarding the subject environmental impact statement (EIS) report:

1. The preferred alternative project (Vol. I, Section 2.4) includes airport expansion and new construction on lands that are designated for revenue generation to the Native Hawaiian Rehabilitation Fund (NHRF) pursuant to Article XII, Section 1, of the Constitution of the State of Hawaii, which states in pertinent part:

   Thirty percent of the state receipts derived from the leasing of cultivated sugarcane lands under any provision of law or from water licenses shall be transferred to the native Hawaiian rehabilitation fund, section 213 of the Hawaiian Homes Commission Act, 1920, for the purposes enumerated in that section. Thirty percent of the state receipts derived from the leasing of lands cultivated as sugarcane lands on the effective date of this section shall continue to be so transferred to the native Hawaiian rehabilitation fund whenever such lands are sold, developed, leased, utilized, transferred, set aside, or otherwise disposed of for purposes other than the cultivation of sugarcane. There shall be no ceiling established for the aggregate amount transferred into the native Hawaiian rehabilitation fund. (Emphasis added.)

The DHHL has identified the following "protected lands", i.e., State lands that on November 7, 1978 were leased for the cultivation of sugarcane, that are in the proposed project area.

Rev. Permit A-4374	119.365 acres	TMK 2/3-8-01:073 & 222
Rev. Permit A-4946	43.164 acres	TMK 2/3-8-01:166
Rev. Permit A-5584	8.354 acres	TMK 2/3-8-03:010
Exec. Order 2594	99.846 acres	TMK 2/3-8-01:134

For each of the parcels listed above, the EIS should respond with the following information:

a. Confirm that the parcel was State cultivated sugarcane lands on November 7, 1978 and are currently under the State Department of Transportation (DOT);

b. Any changes in land use, conveyance terms and conditions, and parcel boundaries since November 7, 1978 to the present; and,

c. State receipts received by DOT since November 7, 1978 to the present and payments of 30% of state receipts to the DHHL's NHRF.

In addition, please identify other lands which were State cultivated sugarcane land on November 7, 1978 that would come under the jurisdiction of the DOT under the proposed project.

THE EIS SHOULD IDENTIFY WHICH STATE SUGARCANE LANDS WILL BE IMPACTED BY THE PROPOSED PROJECT AND HOW THE PROJECT WILL ADDRESS THE CONSTITUTIONAL MANDATES FOR PROVIDING AND CONTINUING THE FLOW OF INCOME TO THE NATIVE HAWAIIAN REHABILITATION FUND. See Comment DHHL-1

2. The relocation of helicopter/general aviation operations to an off-airport site (Vol. I, Section 4.4.3) may also impact the DHHL Native Hawaiian Rehabilitation Fund and other Hawaiian Home Lands programs. A portion of the preferred site at the Old Puunene Airport is now under State sugarcane General Lease No. 4197, and is subject to the NHRF. In addition, approximately 726 acres of the total area will fall under the jurisdiction of the DHHL in accord with a land conveyance authorization by the Board of Land and Natural Resources on October 9, 1994.

THEREFORE, FUTURE SITING OF A HELICOPTER/GENERAL AVIATION FACILITY IN THE VICINITY OF THE OLD PUUNENE AIRPORT ON LANDS UNDER DHHL JURISDICTION WILL BE SUBJECT TO THE APPROVAL OF THE HAWAIIAN HOMES COMMISSION. See Comment DHHL-2

A response to our comments in the Final EIS will be greatly appreciated. If you have any questions, please call Darrell Yagodich of our Planning Office at 586-3836.

4057L

cc FAA
State DOT-Airports
Edward K. Noda & Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

IN REPLY REFER TO:
AIR-EN
97.964

August 20, 1997

TO: KALI WATSON, CHAIRMAN
HAWAIIAN HOMES COMMISSION
DEPARTMENT OF HAWAIIAN HOME LANDS

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
KAHULUI AIRPORT IMPROVEMENTS, KAHULUI, MAUI
STATE PROJECT NO. AM1011-07

Thank you for your comment letter of May 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DHHL-1 - Hawaiian Home Lands Within Proposed Project Area

Please refer to the attached letter from Mr. Randy Y.K. Young to Mr. Rex D. Johnson regarding the payment to the native Hawaiian rehabilitation fund. Also, the attached figure shows the agricultural lands which are and will become Airport property under the Proposed Project and the current owners.

Further, the Final EIS will identify which sugarcane lands will be impacted by the Proposed Project. (See attached)

COMMENT DHHL-2 - Relocation of Helicopter/General Aviation Operations

As indicated in the Draft EIS, the feasibility of relocating helicopter operations or general aviation operations to an off-airport site was considered in the Maui General Aviation Site Selection Study. The Proposed project, as defined in the Draft EIS, includes relocating the helicopter operations just east of its present site at Kahului Airport until the parallel

runway is constructed. The parallel runway is not needed until the Year 2016, if at all; and, therefore, additional environmental analysis will be completed prior to the construction of the parallel runway. Also, general aviation activities will remain at Kahului Airport. Therefore, neither Puunene Airport nor any other off-airport site will be used for general aviation operations.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

JOHN WAIHEE
GOVERNOR

WARREN PRICE, III
ATTORNEY GENERAL

ROBERT A. MARKS
FIRST DEPUTY ATTORNEY GENERAL

STATE OF HAWAII
DEPARTMENT OF THE ATTORNEY GENERAL
425 QUEEN STREET
HONOLULU, HAWAII 96813
(808) 586-1500

August 17, 1992

The Honorable Rex D. Johnson
Director of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Re: Department of Transportation Lands Cultivated as Sugar Cane Lands, Article XII - Sec. 1, State Constitution

This is in response to your memorandum (PMN 7.3499) dated July 20, 1992 as to whether Section 1 of Article XII of the State Constitution, which mandates that thirty percent (30%) of State receipts derived from the leasing of cultivated sugar cane lands under any provision of law or from water licenses be transferred to the native Hawaii rehabilitation fund, applies to certain lands at Kahului Airport, which are under sugar cane cultivation by Alexander & Baldwin, Inc. pursuant to revocable permits.

We conclude that the constitutional mandate does not apply to the particular parcels of land in question.

We understand the facts to be as follows:

The Airports Division has issued two revocable permits to Alexander & Baldwin, Inc. (A&B) for the cultivation of sugar cane on certain lands comprising a portion of Kahului Airport. The Department of Land and Natural Resources (DLNR) has been "administering" the permits, i.e., collecting the rents, etc., but the Airports Division will shortly assume full control of the management of these lands. We understand that the DLNR has been setting aside thirty percent (30%) of the rentals collected from A&B (less its "management" fee) for deposit to the native Hawaiian rehabilitation fund.

The subject lands were in fact conveyed to the Territory by a Quitclaim Deed dated December 10, 1956, pursuant to Public Law 377 of the 82nd Congress approved June 5, 1952 (C.371, 66 Stat. 128), subject to certain conditions. The federal government apparently condemned these lands for a Naval Air Station. The first condition in the Deed, as amended by a Modification of Quitclaim Deed dated August 11, 1968, provides as follows:

> Condition 1. The GRANTEE shall not alienate its title to the property conveyed nor shall it lease the same or any part thereof except for public-airport purposes; provided, that particular structures and parcels of the above described land not required or used for airport purposes may be sold, exchanged, or leased by the State of Hawaii with the consent of the Secretary of the Navy and the Administrator of the Federal Aviation Agency or their designated representatives; provided further, that the proceeds from any such sale or lease, or the property received in any such exchange, shall be used for airport purposes.

The Deed also provides that the Grantor (now through the Federal Aviation Administration under the Second Modification Quitclaim Deed dated January 13, 1983) may, at the option of Grantor, cause a reverter of said lands for a failure to perform or upon a breach of any of the conditions in the Deed.

We note that this restrictive covenant essentially tracks one of the conditions agreed to by the State in receiving federal grant moneys from the FAA under the Airport and Airway Improvement Act of 1982 (Section 511(a)12).

Discussion

Generally, the mandate of Section 1 of Article XII appears to encompass all State receipts derived from the leasing of cultivated sugar cane lands under any provision of law or from water licenses.

However, we do not believe that the constitutional provision applies to the subject parcels because of the restrictive covenant or condition under which said lands were conveyed to the State in 1956 prior to the Constitutional

provision; to otherwise construe it would be to impair the obligation of contracts (in violation of Article I, Section 10 of the U. S. Constitution). Hawaii courts have not favored so construing laws to find them unconstitutional, see Kapiolani Park Preservation Society v. City and County, 69 Haw. 569, 578 (1988), but will do so, Anthony v. Kualoa Ranch, Inc., 69 Haw. 112, 124 (1987). Moreover, to apply the constitutional provision to the subject would result in the possible loss of the airport lands, as the Federal Aviation Administration could exercise its right of reverter to the airport property if revenues are not used for airport purposes. This would be a result obviously not intended by the framers of the State Constitution.

We thus conclude that Section 1 of Article XII of the Hawaii State Constitution does not apply in the instant matter.

Very truly yours,

Randy Y. K. Young
Deputy Attorney General

APPROVED:

Warren Price, III
Attorney General

RYKY:ksy/csa
0592E

FILE

JOHN WAIHEE
GOVERNOR
STATE OF HAWAII

HOALIKU L. DRAKE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

August 11, 1992

MEMORANDUM

TO: The Honorable Rex Johnson, Director
Department of Transportation

FROM: Hoaliku L. Drake, Chairman

SUBJECT: Kahului Airport Master Plan Update, Parcels Cultivated as Sugarcane Lands

It is our understanding that the Final Environmental Impact Statement (EIS) for the subject project was submitted for acceptance pursuant to Chapter 343, HRS, on July 17, 1992. The subject project involves use of certain state lands under the jurisdiction of the Department of Transportation (DOT) that were cultivated as sugarcane lands effective November 7, 1978. The specific parcels are TMK Nos. 2/3-8-01:73, 134, 166.

Per my memorandum of June 23, 1992, these state lands are affected by the provisions of Article XII, Section 1, of the Constitution of the State of Hawaii. Whenever a transaction involving these state lands takes place, even with a change in use from sugarcane to another use such as airport facilities, the Department of Hawaiian Home Lands is entitled to 30% of the state receipts derived. The EIS for the subject project did not cover this matter, therefore, I am writing to bring this to your attention so that its impacts can be considered.

Per your memorandum of July 20, 1992, the DOT is gathering information and seeking clarification from the Department of the Attorney General. I look forward to your response.

D080692C

COUNTY OF MAUI AGENCY COMMENTS

MAY 28 1996

RECEIVED
MAY 24 1996
EDWARD K. NODA & ASSOCIATES

LINDA CROCKETT LINGLE
Mayor
TELEPHONE 243-7855

OFFICE OF THE MAYOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

May 23, 1996

The Honorable Benjamin J. Cayetano
Governor
State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Governor Cayetano:

Maui No Ka Oi. Maui is the best. Maui's citizens deserve the best -- the best airport, the best roadways, the best jobs and a vital economy that will sustain us over the long-term, as well as the best beaches, the cleanest mountain streams and forests and, the best, most diverse natural environment.

The Kahului Airport is our primary link to the rest of the world. The Kahului Airport expansion project will ensure that Maui's citizens will not have to continue living with a second rate air facility, and can also provide solutions to current problems we have with roads, noise, pollution and other environmental problems. Not only do the Airport Improvements offer a cure to existing problems, the improvements protect Maui's future by ensuring the continued safety of airline passengers, facilitating trade for Maui's businesses, and making travel for Maui visitors more efficient.

Because of the valuable benefits to be derived from the Kahului Airport improvements, we fully endorse the 9,600 foot Proposed Plan described in the most recent Draft Environmental Impact Statement (dated March, 1996). We do, however, request that you include the following comments in the Final EIS which we believe will help advance public thought on the Proposed Project.

We look forward to receiving a response from the Lead Agencies for the Kahului Airport Improvements -- the U.S. Department of Transportation, Federal Aviation Administration and Hawaii Department of Transportation, Airports Division.

Sincerely,

LINDA CROCKETT LINGLE
Mayor
County of Maui

LCL/JPS:ko
Attachments
cc: Hawaii Department of Transportation, Airports Division
Federal Aviation Administration
Edward K. Noda and Associates, Inc.
c:\wp51\memo\kahairp.eis

INTRODUCTION

(1) The purpose of our comments is two-fold. First, we want to provide a perspective in the Kahului Airport Improvements Draft Environmental Impact Statement ("Draft EIS") debate. Secondly, we want to point out areas of relative weakness in the Draft EIS's treatment of the alien species problem.

See Comment Mayor-1 and Mayor-2

(2) We request, on behalf of the County of Maui, that the U.S. Department of Transportation, Federal Aviation Administration (USDOT-FAA) and the State of Hawaii Department of Transportation Airports Division (HDOT-AIR) supplement the Draft EIS by incorporating these comments and the attached informative reports (see exhibits A - C). The attached reports help shed light on the relative risk of increased alien species introduction as a result of the airport expansion. Although the Draft EIS addresses the alien species problem, we believe it is very important that the final document reflect all of this additional information so that it will be readily available to the citizens of the County of Maui.

KEEPING THINGS IN PERSPECTIVE

1. The Environmental Impact Statement Process:

(3) I believe that perspective has been lost in the public debate over the Kahului Airport Expansion Draft EIS. Some critics have forgotten the purpose and intent of an EIS. Therefore, we would like to reiterate well-settled principles of EIS law.

(4) Because the Kahului Expansion involves both the State and Federal government, the Draft EIS must fulfill the requirements of both the National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA). Despite some technical differences between the federal and state EIS process, both NEPA and HEPA have similar goals. Both laws were promulgated to ensure that both the government and public are fully informed before proceeding on an action which might have significant consequences to the environment.

(5) In enacting NEPA and HEPA, lawmakers hoped that broad public discussion would enhance environmental consciousness, promote coordination and cooperation between governmental agencies and the public they serve, and additionally, encourage public involvement by providing broad opportunities for public comment. These goals have greatly enhanced state and local government decision-making.

(6) At the same time, NEPA and HEPA were never meant to be, and have never been construed to be, an ultimate obstacle to

governmental action. While both laws require agencies proposing actions to discuss possible significant impacts, potential mitigating actions, and reasonable alternatives to the proposed government action, neither law requires the agency to act on any of this information, nor does the presentation of such information constitute a decision by any agency to implement discussed measures.

(7) NEPA and HEPA do not require an EIS to discuss *all* possible impacts of a proposed action -- only those within reason. Nor must the EIS exhaust all mitigative remedies -- only those within reason. And finally, the law does not require every conceivable alternative be considered -- only those within reason.

(8) The Kahului Airport Draft EIS should be evaluated from this perspective. In this light, the current Draft EIS is a valuable document, compiled in good faith by USDOT-FAA and HDOT-AIR, to meet the requirements set out in NEPA and HEPA. This five volume Draft EIS, consisting of thousands of pages of explanations and hundreds of tables and figures, results from years of research contributed by both governmental and private organizations. It conveys this scientific and demographic data in an understandable and organized manner that even a lay person can understand and from which reasoned decisions can be made.

(9) Within this realm the Draft EIS is a document of vast benefit to the County and State. It uncovers important facts which might have otherwise gone unnoticed, thus providing a document useful for long-term planning. It provides the County, the State, and Hawaii's citizens with a meaningful predictor of possible future problems. As a result of this EIS process the County and State government are provided an opportunity to implement *preventive* rather than reactive policies.

2. The Proposed Airport Expansion is Essential to Remedy Current Safety Concerns:

(10) It must be emphasized that the airport improvements will provide a real, necessary, and long-overdue improvement in airline passenger safety. Currently, Maui residents and tourists must take off and land on a runway considered unsafe by many in the airline industry. The Airline Pilots Association has stated that Kahului Airport is the most dangerous major airport in the state. Right now, the airport runway does not meet the current FAA width standards. Therefore, as an initial matter, it is important to realize that the airport improvements are a necessary safety measure.

(11) The importance of air travel safety cannot be emphasized

enough. Every margin of safety is worthwhile when so many lives are at stake. The issue of airline safety resurfaces each time an airline crash occurs. In the aftermath of these tragic events, newspapers are quick to detail the additional precautionary steps that should be taken by government agencies to make air travel more safe. In contrast, editorials in the same papers point to the irony of this fervent search for safety-in-hindsight: "Government is no good, too large, too intrusive until a plane crashes," states one editorial.

(12) Needed safety precautions at Kahului Airport should not have to wait till a tragedy focuses our attention on existing and known deficiencies. The runway at Kahului Airport currently offers only the minimum margin of safety. Because of the short runway, jets must apply maximum power upon take off. With no reserve power, a pilot's options in an emergency are limited. Landing at Kahului Airport is no better. Pilots have no choice but to brake aggressively because of the inadequate runway length. The risk of a jet unable to stop at the runway's end is thus increased. Whereas, a longer runway would provide a greater margin of safety in the event of pilot error or mechanical problems. Current precautionary measures, such as "safety zones" are inadequate protection to address these potential emergency situations.

(13) The slim margin of error during take offs and landings is further exacerbated by Maui's prevalent high winds. The fact that Kahului Airport is constantly subjected to high and turbulent winds adds yet another risk factor to the equation. Clearly, pilots jockeying in these winds, because of the deficient runway, have fewer options in emergency situations. As one pilot writing to the Air Line Pilots Association explained, "I've flown there with big planes, and I know what it's like. I admit, that with enough practice and familiarity with the winds and the runway conditions, you can learn to make a good landing there, but it shouldn't have to be that way...."

3. The Proposed Airport Expansion Will Eliminate Problems that Already Exist:

(14) Perspective has been lost in the Kahului Airport debate over the benefits and detriments of the proposed expansion. Critics have seized upon the potential negative impacts of the expansion that have been raised by the Draft EIS. While critics point to the problems which are likely to follow from the airport improvements, they ignore the fact that these negative implications already exist and that the proposed project will eliminate or mitigate many of these previously existing problems. In this respect, the Draft EIS can play an important role by identifying solutions to noise, growth and pollution problems which are inherent to life on a

beautiful but small island whose economy is dependent on two million visitors a year.

(15) When potential problems related to the airport improvements are identified, these problems should not be used as reasons to forego the airport improvements, since safety of airplane crews and passengers is of the highest importance. When the benefit is so substantial -- in this case airline safety -- and no alternative readily exists, the preferable response to identified problems is to identify mitigating solutions. The proposed airport improvements and the Draft EIS, to a great extent, accomplish this task.

(16) For example, airport noice is a current problem, not a future problem. The proposed improvements are likely to cause airport noise to decline after the runway is expanded. A longer runway means that less power is needed on take-off. Additionally, jets can be at a higher altitude when they fly over residences. Moreover, the longer runway will allow larger aircraft to land. This may reduce the overall amount of air traffic into Maui, and in return, reduce the frequency of airport noise.

(17) Environmental problems that already exist may be positively impacted by the airport improvements as well. For example, the number of endangered birds in Kanaha Pond Wildlife Sanctuary (KPWS) has steadily declined since 1978. While many factors contribute to this decline, the airport is certainly one of those factors.

(18) Carcasses of the endangered Hawaiian Stilt Bird (Ae'o) have been found around the airfield. Current conditions at Kahului Airport account for this. Rainwater during the wet season is allowed to pool around the runway. These pools, in turn, attract wading birds such as the Ae'o. The airport improvements, however, would help eliminate these deaths. Grading and filling is planned to eliminate pooling. Further, HDOT has recently provided additional land areas to KPWS, which, if developed, would provide safe alternative feeding areas for the Ae'o and other wading birds, thus making the Airport an even less attractive feeding area.

(19) Other critics have listed traffic congestion among the detrimental side effects of the airport improvements. Yet, similar to the conditions described above, these forecasted problems exist today. While the proposed airport improvements may increase traffic in the airport vicinity, the same improvements seek to remedy existing traffic problems and support growth that is already expected whether or not the airport is improved.

(20) Through a series of intersection and roadway improvements, it is expected that the proposed project will in fact

positively impact existing conditions. For example, the Draft EIS outlines plans for a new airport access road and cloverleaf which will divert much of the traffic coming from Lahaina And Wailea that currently must be funneled through the present -- and often congested -- Dairy Road-Hana Highway intersection. Thus, while the airport improvements may lead to an increase in automobile traffic, the planned roadway and intersection improvements will remedy existing traffic problems and accommodate expected future growth.

4. Growth Management Should Not be an Issue in Infrastructure Improvements

(21) A final misconception in the EIS debate concerns the relationship between the Airport and development. Some critics want to keep an inadequate and unsafe airport hoping this will control development. This strategy will fail, and it hurts our own citizens. We have seen this strategy used before. Some people will fight improvements in order to stop development.

(22) Some have fought against improvements of roads and of our water system in order to control development. While this strategy has failed in its attempt to control development, it has succeeded in burdening our own citizens with poor roads and a poor water system in certain areas of the county. You cannot control development with inadequate infrastructure. Development must be controlled through the development process and land use laws.

(23) Like other basic infrastructure necessities, such as wastewater treatment, water, and traffic lights, the airport improvements are intended to remedy existing infrastructure inadequacies and prevent future infrastructure deficiencies. Thus, the runway expansion will increase airline safety for Maui's residents and other travelers. It will also allow existing hotels and businesses to benefit from new markets already available to other Hawaiian islands that are competing for similar business. Finally, the improvements will ensure that already expected growth is accommodated in a rational and ordered manner rather than ignored now to be addressed sometime in the future in a chaotic and reactive fashion.

(24) Research carried out during the EIS process supports this reasoning. Experts quoted in the Draft EIS agreed that growth to Maui was not a function of airport accessibility. However, experts are not needed to verify this proposition. For a long time the Hilo airport on the neighboring island of Hawaii has had in place a 9,800 foot runway, capable of international flights and direct flights from a variety of domestic airports. Yet, the building of the longer runway in Hilo did not result in a flood of additional tourists and uncontrolled development.

(25) Maui's taxpaying residents have a right to enjoy a high level of airline safety and efficiency. Our businesses deserve a top-notch airport. Our citizens should not be forced to live with inadequate facilities all in the name of limiting uncertain future growth.

THE ALIEN SPECIES PROBLEM

(26) While we believe that perspective has been lost on some airport-related issues, we also believe that the supplementation of the alien species issue as addressed in our comments and attachments, is also necessary. Alien species threaten Maui County in distinct but interrelated ways.

(27) Alien species threaten indigenous wildlife. Maui's unique climate and location provide a habitat for many flora and fauna found nowhere else in the world. Native species -- some already rare or endangered -- should be preserved and fostered if at all possible not only because of their intrinsic worth, but for their benefits as well.

(28) The existing and potential benefits from endangered species are numerous. Indigenous species provide an aesthetic benefit and account for much of Maui's allure to kama'ainas and travelers alike. Additionally, Maui's indigenous species are culturally important. Native Hawaiians still use a variety of native plants for traditional healing practices and rituals. Finally, like the oft-touted rainforests of South America, our own rainforests may yield scientific benefits yet to be discovered.

(29) Numerous organizations and governments have acknowledged the importance of native species, and have worked together to designate important reserve lands on Maui to protect these species from endangerment. Puu Kukui Reserve, managed jointly by The Nature Conservancy (TNC) and Maui Land and Pine who owns the property, is the largest private nature reserve in the state, consisting of 8,000 acres. Haleakala National Park (HNP), provides an additional 28,000 acres of habitat for native wildlife, providing a variety of ecosystems, ranging from sea level to over 10,000 feet. TNC, working in conjunction with Haleakala Ranch and its lands, created the Waikamoi Preserve, an area of more than 5,000 acres which adjoins HNP. And, the State of Hawaii's Natural Area Reserves system provides an additional 18,000 acres of protected areas in several locations on Maui.

(30) Alien species that successfully enter these protected habitats could alter the delicate ecosystems within thus threatening native plants and animals. The attached documents discuss the likelihood of this threat and explain some of the

preventative measures that should be considered to reduce the risk of alien species introduction into sensitive native habitat areas.

(31) Besides threatening indigenous species, alien species threaten Maui's sizable agricultural economy. Roughly 350,000 acres of Maui are under cultivation producing an annual crop yield valued at $140 million dollars. Livestock generates an additional $11.7 million. Previously introduced species have already cost our farmers millions of dollars in lost revenues each year. Agricultural losses are felt throughout Maui County's economy, impacting not only businesses but laborers as well.

(32) For all these reasons we believe it would be helpful to further address the alien species problem -- a problem which is with us now. Since 1970, twenty new invertebrate species per year have been accidently transported to Hawaii, with 50% of these becoming economic pests.

(33) Addressing the alien species issue, however, must not be confined to merely discussing the potential impacts from runway expansions. The alien species problem is more complex. For example, alien pests do not discriminate in their mode of transportation. They will allow themselves to be transported by any available means. Besides introduction through airports, alien species travel through the mail and hide deep within containers shipped by sea. Maui receives shipments from each of these sources, and as a result of these shipments, receives the increased threat of alien species introduction. While efforts are made selectively to inspect ship cargo and mail from Oahu, it is far from an exhaustive search.

(34) In addition, it is unclear that alien species introduction will increase as a result of direct domestic or international flights compared with flights that must make a preliminary stop on Oahu. Existing air travel already accounts for a significant amount of the alien species introductions. In 1994 alone, inspection of domestic and international flights intercepted over one hundred alien insects and close to two hundred illegal animals. Inspections are not faultless, thus interceptions data fail to reflect the numbers of other alien species that arrive in Hawaii undetected.

(35) Where species arrive undetected, it poses the risk of introduction not only on Oahu, but because of interisland connections, on Maui as well. For instance, thousands of bags arrive daily on interisland flights receiving little, or no, inspection during their short stay at the Honolulu airport and receive a similar treatment by inspectors on Maui.

(36) Further, in the future interisland flights will continue to carry a majority of the potentially high risk cargo. Experts

predict that the bulk of air travel growth to Maui will continue to involve routing through Honolulu Airport even if the runway is expanded. Thus, interisland flights will continue to provide a substantial mode for alien species introduction, without regard to any runway expansion.

(37) Finally, it is unclear that the environmental conditions at Kahului Airport will make Maui more susceptible to alien species introduction as a result of the airport improvements. The Hilo Airport's experience with its airport expansion manifests this possibility. Like the Kahului Airport, the Hilo Airport is situated in a humid part of the Big Island with prevailing onshore winds. With similar natural features, each airport provides perfect conditions for fostering the introduction of alien species. Yet, the Hilo airport expansion, and its internationalization -- which was completed years ago -- has not caused an evident increase in alien species introduction.

(38) The above points make it clear that the alien species problem will not be adequately addressed by discussing in isolation the pest control ramifications of the Kahului runway expansion. Instead, the Kahului Airport improvements should be viewed as an opportunity to improve existing prevention and control measures and prepare Maui now for future alien species problems which will undoubtedly follow, expanded runway or not.

(39) Because of the continued threat of alien species -- from whatever source -- research of alien species introduction should continue and new controls should be considered to put in effect a comprehensive state-wide prevention and control system.

(40) We believe that our comments and the attached studies and documents will improve state-wide understanding of the complex alien species problem thus leading to better-informed decisions in this area. The supplemental information can be broken down into five categories which follow.

1. Expert Advice:

(41) We were concerned enough about the alien species problem that we retained an independent expert to study this issue. Richard Lipsey, Ph.D. has reviewed the EIS and has generated a report which is attached to these comments and is hereby incorporated by reference. (See exhibit "A")

(42) Dr. Lipsey is an expert in entomology and toxicology. His resume is attached to his report. Dr. Lipsey has also included The Alien Pest Species Invasion in Hawaii: Background Study and Recommendations for Interagency Planning (discussed below) (see

exhibit "B") and Two Case Studies: Non-Indigenous Species in Hawaii and Florida (discussed below) (see exhibit "C") to his report which, read with his report, are quite informative.

(43) It appears that the solutions to existing and potential roblems are already in place or close at hand. The Hawaii Department of Agriculture (HDOA) is doing a fine job but more personnel and readily available technology will help in reducing the chances of mainland pests being introduced into Maui.

(44) Because any international flights coming to Maui would be inspected by U.S. Customs, U.S. Department of Agriculture (USDA), and U.S. Immigration, user fees would be charged. Therefore, the user fees from any increase in flights would pay for the necessary increases in personnel and equipment.

(45) We would urge the Governor to make available appropriate funding to increase HDOA personnel and equipment at Kahului Airport to inspect incoming mainland flights. It is our understanding that a new color x-ray machine costs approximately $75,000 while upgrading an older black-and-white x-ray machine to color costs around $35,000.

2. The ASAP Document:

(46) The Draft EIS does include one document -- The Alien Species Action Plan (hereinafter "ASAP") (see Appendix Q of Draft EIS) -- which we believe is helpful on this subject. This document was prepared in 1994 by an advisory task force made up of federal, state and private representatives. Among its findings, it emphasizes the need for increased coordination among public and private organizations, and the importance of public education in alien species prevention.

(47) While the findings of ASAP were broad, several of the ASAP's measures have significance to air travel. Some of these are mentioned here. Inspections by the USDA, the U.S. Fish and Wildlife Service, and HDOA should be coordinated so that efficiency and breadth of inspections increases. More incoming airlines should make use of an existing airline video on alien species. The U.S. DOA alien species list should include pests likely to be introduced in Hawaii, thus empowering federal inspectors to stop and inspect high risk cargo. The Military Customs Inspection Program located in Guam should continue, to avoid introduction of the Brown Tree Snake. The ASAP additionally stressed, throughout, that many of its recommendations could be implemented without additional funds or staff.

(48) In its current form the Draft EIS lists the

recommendations of the ASAP (see section 3.11.3.2 of Draft EIS). The lead agencies should consider discussing how these recommendations relate to the Kahului Airport Improvements.

3. Background Study:

(49) Additionally, The Alien Pest Species Invasion in Hawaii: Background Study and Recommendations for Interagency Planning (hereinafter "Background Study") (see exhibit "B"), which was prepared by the Nature Conservancy of Hawaii and the Natural Resources Defense Council in 1992, should be appended to the Final EIS. The Background Study provides an in-depth description of existing federal, state, and private controls. It explains existing measures to prevent introduction of pests and to control alien species and identifies problems with these measures, offering guidance for future implementation.

(50) Like the ASAP, it recommends improved inter-agency coordination and increased public awareness. The Final EIS should append this document and discuss relevant data within the appropriate EIS sections.

4. Comparative Study:

(51) The U.S. Congress, Office of Technology Assessment (OTA) created a detailed comparative study called, Two Case Studies: Non-Indigenous Species in Hawaii and Florida (see exhibit "C") which is Chapter 8 of a larger OTA publication, *Harmful Non-Indigenous Species in the United States* (OTA-F-565, Sept. 1993). The comparative study discusses the similar problems these two tropical states face. It attempts to identify lessons learned in each state and how this information can be applied in the future. It also explains how Hawaii's unique problems will sometimes require differing policy treatment.

(52) Because this comparative study offers a history of another State's treatment of the alien species problem, it should be appended to the Final EIS.

5. Maui County's Opinion on the Above Sources and Others:

(53) The lead agencies should consider implementing some or all of the following strategies:

(54) Data collection may need to be improved. Data collection used to track and map alien species incidents would be helpful in evaluating the source of alien species introduction and identify

the appropriate measures to prevent such introductions.

(55) Surveillance of alien species may need to be improved. Once an alien pest is introduced, surveillance may help stem the spread of the pest. Surveillance measures might include early detection systems, tracking systems and trapping equipment.

(56) Quick Response teams, experienced in alien species eradication, should be trained and available for immediate deployment. Quick Response to an alien species introduction may conserve government funds. Additionally, quick response improves the chances that the alien pest can be totally eradicated.

(57) Suitable Inspection Facilities are needed. Open air inspection increases the chances that an alien species will escape. A sterile, closed environment inspection facility should be considered in the airport improvements.

(58) High risk cargo and baggage should be cordoned off from low-risk baggage and routed to a closed environment inspection facility.

CONCLUSION

(59) The County of Maui supports the preferred alternative of a 9,600 foot runway with the proposed collateral improvements. The County also urges the HDOT-AIR and FAA to seriously consider the mitigating pest control suggestions enumerated in this document.

Sincerely,

Linda Crockett Lingle
Mayor
County of Maui

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.998

August 20, 1997

The Honorable Linda Crockett Lingle
Mayor
County of Maui
Wailuku, Hawaii 96793

Dear Mayor Lingle:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 23, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT Mayor-1 - EIS Perspective

We agree that much of the public debate over the Proposed Project has lost its perspective regarding the benefits versus the costs of the Proposed Project. Every public, and many private, projects involve a tradeoff between that which exists at present and that which may exist in the future. In general, we all try to provide projects that will benefit the public to the maximum extent possible while minimizing any potential adverse environmental (natural, social and economic) effects. This is the policy that the State of Hawaii Department of Transportation (HDOT) has implemented in the past and will continue to do so in the future. We believe past airport projects at Kahului have demonstrated improved airport operations efficiency, thereby benefitting the residents of and visitors to Maui. The Proposed Projects are being and have been planned to further increase airport operating efficiency, as well as provide increased safety margins for all of us. We appreciate your identifying the

County's perspective of the Proposed Project and look forward to continuing to work with your office and staff in future airport development projects.

COMMENT Mayor-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following:

availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS.

Similarly, the informational materials provided along with your letter will be incorporated into the Final EIS. Lastly, the strategies noted in your comments have, for the most part, been incorporated into the Alien Species Biological Assessment and suggested as feasible mitigation measures to be implemented as part of the Proposed project. We note that should the No-Action

Alternative be adopted, none of the alien species mitigation measures would be implemented and the problem would continue unabated except for those actions that the Hawaii Department of Agriculture and U.S. Department of Agriculture can implement on their own. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

COUNTY COUNCIL
COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

May 16, 1996

Federal Aviation Administration
Honolulu Airports District Office
Attn: David J. Welhouse
Box 50244
Honolulu, Hawaii 96850

Dear Mr. Welhouse:

SUBJECT: **Draft Environmental Impact Statement for the Kahului Airport Improvements (Paf 96-110)**

I am writing as the Chair of the Maui County Council's Economic Development, Tourism and Environment Committee, as well as a Native Hawaiian, to comment on the Draft Environmental Impact Statement (EIS) for the Kahului Airport Improvements project.

My concerns over the draft EIS focus primarily on the issue of alien pest species. The Economic Development, Tourism and Environment Committee (EDTE) has been discussing the threat of Guam's brown tree snake since February 1995 and the threat of other alien pest species in general for nearly one year. These discussions have included meetings, briefings and site inspections and have resulted in appropriations by our Budget Committee, extensive press coverage and increased public and government awareness statewide, including a resolution adopted by the Hawaii State Association of Counties urging the State Legislature to support the Coordinating Group on Alien Pest Species. A copy of this resolution is enclosed for your information.

See Comment SPK-1

The five-volume, twenty-two pound draft EIS contains only eight pages, excluding the grossly outdated Appendix Q, devoted to the impact the proposed airport expansion/improvement would have on alien species proliferation. The draft EIS also makes virtually no mention of the present or future agricultural inspection operations needed to curb this infestation. EDTE conducted a site inspection of the State and Federal agricultural inspection facilities at Kahului

Airport to make our own determination of the impact the proposed airport expansion/improvement would have on these operations.

Surely, you should have devoted more than eight pages to this extremely important environmental issue.

There was no mention that the United States Department of Agriculture (USDA) would have to completely overhaul its operations at Kahului Airport to begin agricultural inspections of international arrivals. USDA's current operations in Maui County only involve inspections of mainland departures. Direct international arrivals would require a dramatic increase in USDA's current jurisdiction, authority and procedures at Kahului Airport. Direct international arrivals present an entirely new threat to Maui's environment and agriculture, and the agency responsible for mitigating this threat must be given far greater consideration in the draft EIS than brief mention of its funding mechanisms.

Additionally, the draft EIS asserts that direct international arrivals to Kahului Airport would not increase Maui County's susceptibility to the threat of alien pest species, since interisland flights and other forms of transport could carry these pests from other international airports in the State. This argument lacks as much responsibility as it does logic. USDA's inspection procedures at the Honolulu and Kona airports may not be foolproof, but that in no way should suggest that inspection procedures at Kahului Airport strive for less than 100 percent effectiveness. Further, the Honolulu Airport is predominantly surrounded by water and asphalt, while the Kona Airport is surrounded by lava fields. The Kahului Airport, predominantly surrounded by sugar cane and a wildlife refuge, is far more sensitive to the threat of alien pest species than the other international airports in the State.

The draft EIS also contains no analysis of the current agricultural inspection facilities and how these operations could be improved to provide more effective interception capabilities with new and increased arrivals. In other words, if the airport is proposed to be improved and/or expanded, why not improve the current agricultural inspection capabilities, too? I believe that the current agricultural inspection facilities and operations should be improved before the proposed airport expansion/improvement occurs – more staff, more equipment and more technology – and definitely before new and increased arrivals occur. The draft EIS admits that the introduction of alien pest species is a current and future problem but does not offer a solution. Why not improve our

agricultural inspection capabilities to at least address the future threat with sufficient staff, adequate equipment and the most recent technology?

It is ironic that the visitor industry is promoting this project so intensely, when the project presents such a grave threat to one of Maui County's greatest visitor attractions: our lush and pristine environment. Our visitors choose Maui County because of tropical forests and undeveloped mountains, and it is obviously worth the cost, inconvenience and time of the extra airplane flight to visit these relatively unspoiled islands. Nothing threatens this more than direct international flights.

We have seen the devastation that the plant pest *Miconia Calvescens* has wrought in East Maui, destroying native forests, displacing native wildlife and threatening our watershed areas. This plant has invaded roughly two-thirds of the native forests on Tahiti, where it is called the "green cancer." Fortunately on Maui, we have diligent and dedicated experts united against this pest in a battle which we seem to be winning, a battle which will cost hundreds of thousands, if not millions, of County, State and Federal dollars. This is just one example of one alien pest on one of our islands. Have we not learned our lesson?

I urge your Office, and the other consulting parties and agencies who will prepare the final EIS, to give the threat – and prevention – of alien pest species the research, analysis and resolution this vital issue warrants.

Very Sincerely,

SOL P. KAHO'OHALAHALA
Councilmember

paf:96-110a:mnc
Enclosure

Hawaii State Association of Counties

Counties of Kauai, Maui and Hawaii, City & County of Honolulu

RESOLUTION URGING SUPPORT OF THE COORDINATING GROUP ON ALIEN PEST SPECIES.

WHEREAS, the Hawaiian Islands are among the most environmentally sensitive areas in the world, containing extremely unique and fragile ecosystems; and

WHEREAS, these 150 recognized ecosystems are home to more than one-third of the 526 plant species and 88 bird species on the United States endangered and threatened species list; and

WHEREAS, conservationists call Hawaii the "Endangered Species Capital of the World," as three-fourths of the nation's extinct plant and bird species once lived only on our islands; and

WHEREAS, alien pest species are noted to be the single greatest threat to the survival of our native Hawaiian plant and bird species; and

WHEREAS, the island of Guam is now devoid of any and all avian life due to the devastation of a well-known alien pest, the brown tree snake; and

WHEREAS, the economic impact of alien pest species in the State of Hawaii exceeds $400 million annually, while we spend only $25 million on prevention; and

WHEREAS, 19 new insect species found their way into the environment in 1994, even though the State Department of Agriculture inspected 13 million agricultural parcels entering the State and intercepted 131 alien insects and 183 illegal animals; and

WHEREAS, on average, 20 new insect species arrive in Hawaii each year, of which ten become pests; and

WHEREAS, federal quarantine law gives the United States Department of Agriculture the legal authority to inspect baggage and passengers bound for the mainland from Hawaii in order to protect the mainland's environment, but does not grant the same authority to inspect baggage and passengers bound for Hawaii from the mainland to protect our environment; and

WHEREAS, Governor Benjamin J. Cayetano established the "Coordinating Group on Alien Pest Species" (CGAPS), comprised of State and federal officials as well as representatives from conservation, agricultural, cultural, botanical, tourism and transportation organizations, which was funded by the State Legislature through the Governor's Agriculture Coordinating Committee; and

WHEREAS, CGAPS focuses attention not only on preventing new alien pest species from entering our State, but also on controlling pests which are already established; and

WHEREAS, budget concerns on the State and federal levels will have a serious impact on the agencies which contribute to these prevention and control efforts; and

WHEREAS, the costs of these efforts pale in comparison to the price we would pay if our environment, and therefore industries such as tourism and agriculture which depend on environmental quality, are not preserved and protected; and

WHEREAS, CGAPS intends to make formal proposals to the State Legislature during the 1996 and subsequent sessions, requesting financial and political support for its efforts; now, therefore,

BE IT RESOLVED by the Hawaii State Association of Counties, that it hereby expresses its most earnest support of the efforts of the Coordinating Group on Alien Pest Species, and that it urges the State Legislature to provide the financial and political support needed for CGAPS to continue its efforts to prevent and control alien pest species; and

BE IT FINALLY RESOLVED that copies of this resolution be transmitted to the President of the State Senate; the Speaker of the State House; Ms. Letitia N. Uyehara, Chair, Coordinating Group on Alien Pest Species; and Mr. Alan Holt, Director of Science and Stewardship, The Nature Conservancy of Hawaii.

INTRODUCED BY:

RENE MANSHO
President

DENNIS NAKAMURA
First Vice President

RONALD KOUCHI
Second Vice President

TAKASHI DOMINGO
Secretary/Treasurer

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

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GLENN M. OKIMOTO
Brian K. Hinasi

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
96.492

August 20, 1997

The Honorable Sol P. Kaho'ohalahala
Councilmember
Maui County Council
200 High Street
Wailuku, Hawaii 96793

Dear Councilmember Kaho'ohalahala:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 16, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT SPK-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is

available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

#3 SK

Ken R. Fukuoka
Director of Council Services

COUNTY COUNCIL
COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

May 8, 1996

Mr. David J. Wellhouse
Federal Aviation Administration
Airports District Office - Box 50244
Honolulu, Hawai'i 96850

RE: National Parks Alert - Airport Expansion on Maui

Dear Mr. Wellhouse:

The attached National Parks and Conservation Association alert was brought to my attention over the weekend and if, as it states, the National Park Service has been excluded from discussions with the FAA and the State Department of Transportation regarding the threat alien species would pose to Haleakala National Park – recognized as an International Biosphere Reserve; holding more endangered species than any other site in the National Park System – then the DEIS offered by them and the U. S. Department of Transportation is, at best suspect, at worst proposing few additional mitigative measures than those currently existing at Kahului Airport which are inarguably underfunded, underequipped and undermanned. (see attached Maui *News* article from May 3, 1996.) See Comment SK-1

Attached as well, are the only four pages in the entire five-volume text of the DEIS that address the issue of increasing alien species introduction with the addition of more flights to Kahului. See Comment SK-2

As my committee learned on May 2, the present staff at Kahului Airport would be unable to handle increased air traffic to Kahului See Comment SK-3

It is my earnest belief that Federal, State and County authorities must re-open discussion as to the threat of greater alien species introduction; re-assess mitigative measures proposed vs. those needed; and, allow the National Parks Service appropriate input into the EIS process before closure of the public comment period and before the proposed expansion of Kahului Airport moves any further along.

I most respectfully urge your kind consideration and support.

Aloha,

Sol Kaho'ohalahala
Councilmember

SK:ep
Attachments
cc: Owen Miyamoto-DOT
96-0508a doc

National Parks and Conservation Association

ALERT

HAWAII PARKS ALERT: AIRPORT EXPANSION ON MAUI

April 1996

Haleakala National Park, on the island of Maui, is probably the best preserved piece of tropical rainforest in the National Park System. Its 29,000 acres comprise one of the smaller national parks, but what it lacks in size it easily makes up for in biological importance. We need your help today to preserve this gem in the face of an imminent threat from expansion of Maui's only airport, a scant 15 miles away.

Haleakala is recognized as an International Biosphere Reserve; it holds more endangered species than any other site in the National Park System. But it also serves as host to more than 1.6 million human visitors a year, and several more nonhuman, which are far more dangerous. As in other parks on the islands, alien species pose a grave threat. Despite a long-established screening and quarantine process designed to detect their presence, dozens of non-native species arrive in Hawaii every year—often carried on international air connections through Honolulu International Airport. If alien species are not controlled, Hawaii could become the next Guam, where an extraordinarily effective predator, the brown tree snake, has wiped out nearly every native bird species.

Nothing can guarantee that exotic species won't be introduced into Haleakala, but if international flights land at Maui's Kahului Airport as currently planned, the chances for a biological catastrophe will be greater. The airport is only 15 miles from the park, and much of the area in between is fertile agricultural land planted in sugar cane, unlike the inhospitable environment around Honolulu International. On top of that, Haleakala has an unusual variety of habitats, at altitudes from sea level to 10,000 feet, ideal for a wide variety of invading species to become established.

HERE'S HOW TO HELP: A recently completed environmental impact statement (EIS) fails to adequately address the question of alien species: in fact it virtually ignores the issue. We need to make our voices heard during the public comment period, due to expire May 23. Write to the officials below, and make the following points:

The EIS inadequately addresses the most serious issue raised by expanding Kahului Airport: the risk of introducing non-native species. It is therefore unacceptable. In fact, the Federal Aviation Administration (FAA) has already indicated its belief that airport expansion would pose no threat to endangered species.

The EIS fails to establish inspection and quarantine procedures for the airport. If international flights start landing without such procedures, the chances of disaster striking are multiplied immeasurably.

The FAA and Hawaii Department of Transportation, joint authors of the EIS, have excluded the National Park Service from discussions. The Park

DOCUMENT CAPTURED AS RECEIVED

Maui News 5-3-96 p.1

Crew lacks staff and tools

State airport inspectors explain woes to council

By TIMOTHY HURLEY
Staff Writer

KAHULUI — Maui County Council members inspected the airport inspectors Thursday, and this is what they found:

Although the state Department of Agriculture inspection crew at Kahului Airport is a hard-working team, they are undermanned and ill-equipped compared with their federal counterparts — this despite having a much larger mandate.

Maui's agricultural inspection facilities came under the spotlight Thursday during a site inspection by the council's Economic Development, Tourism and Environment Committee.

The meeting was called by committee Chairman Sol Kaho'ohalahala to view the facilities responsible for protecting the island from the introduction of harmful plant and insect pests.

In addition, the meeting was intended to give further insight into the challenges Maui faces if and when the airport is expanded to accommodate international flights.

Committee members met with both state and federal inspectors, with airport expansion foes and other interested parties in tow.

Among other things, the committee learned that while the U.S. Department of Agriculture crew numbers 55 part-time and nine full-time inspectors, the state has only seven full-time employees.

The USDA is mainly responsible for inspecting baggage headed to the Mainland, while the state inspectors are charged with inspecting all incoming and interisland baggage and cargo throughout the county.

The USDA is equipped with a high-tech color X-ray machine able to detect any organic material. The state inspectors have their eyes and a specially trained beagle, plus they rely on the honesty of travelers who fill out the agriculture inspection forms.

Chief State Inspector Dennis Tokuoka said his staff operates on a priority system that allows some flights to land without full inspection.

"We need more staffing to do a more thorough job," he told the council members.

Tokuoka said he has an efficient staff that uses radios and golf carts to rush to incoming planes. He said his dedicated workers forego vacation time and other forms of leave to get the job done.

"Any increase in the number of flights, and the present staff will not be able to do the job," he said.

Yet, Tokuoka added, he has been informed that as many as 16 additional charter flights a

See COUNCIL on the next page

The Maui News / EUGENE TANNER photo

During a tour of agricultural inspection facilities at Kahului Airport Thursday, Department of Agriculture Chief State Inspector Dennis Tokuoka (left) explained to Sol Kaho'ohalahala (standing) and other County Council members how cargo is inspected.

Service is our steward of the land and resources at Haleakala; its absence from the process makes the conclusions of the EIS suspect, at best.

Please write your letters today! Here are the addresses:

Send original letter to:
David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850
808-541-1243

Send copy of letter to:
Owen Miyamoto
Department of Transportation, Airports
Honolulu International Airport
400 Rodgers Blvd. #700
Honolulu, HI 96819
808-838-8600

Also, if you can, please attend a public meeting on the Haleakala issue:

May 8th, 7:00pm, at Kahului Airport Terminal, Gate 39.

National Parks and Conservation Association
1776 Massachusetts Avenue, N.W.
Washington, DC 20036
202/223-6722

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HAWAII PARKS ALERT: AIRPORT EXPANSION ON MAUI

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

VOLUME V OF V

KAHULUI AIRPORT IMPROVEMENTS
KAHULUI, MAUI, HAWAII

State Project No. AM1011-07

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

and

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

GOVERNOR, BENJAMIN CAYETANO

Prepared by:
Edward K. Noda and Associates, Inc.

March 1996

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SUBSCRIPTION RATES

Council visits with inspectors

Continued from Page A1

Kaho'ohalahala said he would like to use the council to help "bridge the gaps" between the state and federal operations for more efficient use of tax dollars.

Although the two inspection crews apparently are prohibited from sharing equipment, Kaho'ohalahala said he wants to see what the council can do to change that.

The councilman added that he doesn't like the idea that Lanai travel is given lowest priority for baggage inspection. He said there are bugs and diseases that can spread from one island to another — with devastating results.

Alan Holt, director of science and stewardship for the Nature Conservancy of Hawaii, said that while a hard-working inspection team is in place at Kahului, there are obvious deficiencies in the system. He said officials need to put their "funds and heads" together to improve the system.

"It's not rocket science," he said. "It's clear one operation is more efficient than the other.

"I feel sorry for the (state) Department of Agriculture," Kaho'ohalahala said. "They do a great job, but they don't have all the necessary tools to make their job efficient."

MITIGATION MEASURES. The proposed airport improvements are not expected to affect health care facilities or services on the island. Therefore, mitigation measures are not warranted.

LEVEL OF SIGNIFICANCE AFTER MITIGATION. Because the forecast shortfall in is a island-wide impact, the impact will remain cumulatively significant.

5.1.5 STATEWIDE IMPACTS

5.1.5.1 Alien Species

IMPACT ANALYSIS. As describe in Section 3.11.3, the introduction of harmful alien species to the State of Hawaii has been a problem for over a century, and has recently become a major public issue throughout the state. Harmful alien species are those organisms, plants, predators and insects which thwart the shipment of local produce to other overseas markets; damage native forests, streams and watersheds; compete with and cause the extinctions of native flora and fauna; and carry diseases that affect native species, agricultural crops, livestock and humans (Section 11, Reference 21).

Currently, at least 20 state, federal, and private organizations are active in the prevention and control of alien pests and spend over $50 million each year to address this problem. Recently, over 80 state, federal, businesses, private and non-profit groups have collaborated in the Alien Species Action Plan (ASAP) Working Group to produce a strategy to strengthen Hawaii's protection against this pest invasion. The Working Group has prepared recommendations which are presented below and in Appendix Q.

As forecast in the State Airport System Plan (SASP) and the recent updated forecasts, there will be an increase in passengers and cargo to Maui with or without the Proposed Project. As a result, the potential for the introduction of alien flora or fauna species (pests) to Maui (or increasing the rate of introduction) may also increase. As stated above, the introduction of alien species is an existing problem. Moreover, alien flora or fauna species may be introduced through other ports of entry in the State, not just through Kahului Airport. Thus, the problem is considered to be a significant cumulative statewide issue.

MITIGATION MEASURES. As stated in Section 3.11, the HDOT-AIR will continue to work with various Government agencies to deter the introduction of alien species (especially pests) through its airports. As in the past, HDOT-AIR will support the DOA and the USDA in developing and implementing a program of increased inspection of incoming baggage. With the exception of pre-cleared Canadian flights, all international aircraft and passengers are inspected by the USDA. International inspection by USDA is funded from an international arrivals inspection fee of $1.45 per passenger. This fee is paid by the passenger, collected by the airline as part of the ticket cost, and then paid by the airline to USDA. There is also an

inspection fee of $53 per aircraft paid by the airline for USDA to inspect the plane and the cargo. Because it is separately funded, obtaining personnel for international USDA inspection is not difficult; in fact, it is mandated by federal law. This should not be confused with USDA pre-clearance inspection for domestic US flights which is paid out of the federal government's general fund. In addition to USDA fees, the international arrivals fees for Customs is $5.00, and for INS $5.00. These are collected the same way as USDA's fees by the airlines. All tolled international passengers each pay $11.45 in arrival fees.

HDOT-AIR will continue to work with the Airlines Committee of Hawaii (ACH) in developing an educational program for passengers on awareness of alien species. In the past, HDOT-AIR has funded State Agriculture Inspectors, and will request additional funds from the ACH. In addition, HDOT-AIR will provide support facilities to assist USDA and HDOA in their inspection activities. These support facilities could include X-ray machines, dogs, and etc.

LEVEL OF SIGNIFICANCE AFTER MITIGATION. The impact of alien species is a statewide problem and will not be fully resolved in this EIS. The issue will continue to be significant problem with or without the Proposed Project.

5.1.6 INTERNATIONAL OPERATIONS

Direct international roundtrip flights and Federal Inspection Service (FIS) facilities may have an impact on the growth-inducing effects of the project. These impacts are summarized in Section 6.0, and Section 8.2. A detailed analysis is presented in Appendix E (Socio-economic Impact Assessment). In addition, direct international flights to Maui has led to a concern about the introduction of alien species into Maui's ecosystem and is also addressed in Section 8.2.

8.2.5.6 Air Quality, Climate And Meteorology Impacts

Based on the analysis performed for the Proposed Project, the FIS facility would have no significant impacts are expected on climate, meteorology and air quality.

8.2.5.7 Water Quality Impacts

No significant impact is expected as the FIS facility will not be constructed near a body of water. The interim facility would have no impact.

8.2.5.8 Department Of Transportation (DOT) Act, Section 4(f) Impacts

The construction of any FIS facility would be on the airport proper and will not impact lands covered under the DOT Act, Section 4(f). The interim facility would have no impact.

8.2.5.9 Historic, Architectural, Archeological And Cultural Resources Impacts

The construction of a new international facility will likely be on lands which have been previously disturbed and is not expected to impact any historical, architectural, archaeological or cultural features. The interim facility would have no impact.

* 8.2.5.10 Biotic Communities Impacts

The construction of new facilities will probably be on previously disturbed lands and is not expected to have any impact on biotic communities, including endangered species. The interim facility would have no impact on biotic communities due to construction.

Direct international flights to Maui has led to a concern about the introduction of alien species into Maui's ecosystem. The protection of Maui's environment against alien pests that could be introduced by the arrival of direct overseas flights hinges on measures of control taken by state and federal agricultural inspection services. The island of Oahu has been faced with this problem for many years due to the arrival of direct overseas flights at HIA. Maui has actually been exposed in a secondary fashion because numerous overseas visitors proceed directly to Maui after FIS processing at HIA, and pre-cleared Canadian visitors and overseas aircraft land at Kahului. Failure to detect pests on their persons or in their possessions could lead to infestation on Maui even under present conditions.

International inspection by USDA is funded from an international arrivals inspection fee of $1.45 per passenger. This fee is paid by the passenger, collected by the airline as part of the ticket cost, and then paid by the airline to USDA. There is also an

inspection fee of $53 per aircraft paid by the airline for USDA to inspect the plane and the cargo. Because it is separately funded, obtaining personnel for international USDA inspection is not difficult, in fact it is mandated by federal law. This should not be confused with USDA pre-clearance inspection for domestic US flights which is paid out of the federal government's general fund. In addition to USDA fees, the international arrivals fees for Customs is $5.00, and for INS $5.00. These are collected the same way as USDA's fees by the airlines. All tolled international passengers each pay $11.45 in arrival fees.

Given that Maui has a more sensitive agricultural environment than Oahu because of it's emphasis on flowers and tropical fruits, it will be necessary to provide Kahului Airport with modern inspection facilities and for the inspection services to operate with effective procedures to enforce stringent standards. The 2010 forecasts assume two direct international flights per day at Kahului, and even if this doubles in the long term, thorough inspection of that relatively small number of aircraft and passengers should not be difficult. In fact, having agricultural inspection facilities and procedures at Kahului Airport that are tailored to Maui's specific needs may be more effective in excluding alien pests than those at HIA.

An alien species task force has studied this problem in depth and HDOT-AIR will cooperate with the task force to reduce the risk of alien species importation if and when direct international flight facilities are provided. This issue is addressed further in Section 3.11, Section 5.0 and the recommendations of ASAP are in Appendix Q.

8.2.5.11 Wetlands Impacts

If a new or interim FIS facilities is built at Kahului Airport will be located in the existing terminal area and, therefore, no impacts to wetlands are expected.

8.2.5.12 Hydrology, Floodplain Management And Drainage Impacts

The location of new or interim FIS facilities will be in the existing terminal area. No significant impacts are expected.

8.2.5.13 Coastal Zone Management Program Impacts

The location of new or interim FIS facilities will be in the existing terminal area. No significant impacts are expected.

8.2.5.14 Wild And Scenic Rivers Impacts

There are no wild and scenic rivers near Kahului Airport, therefore, this category is not applicable.

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.953

August 20, 1997

The Honorable Sol Kaho'ohalahala
Councilmember
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

Dear Councilmember Kaho'ohalahala:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 8, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT SK-1 - Exclusion of National Park Service (NPS) from Discussions regarding Alien Species

The NPS has been consulted regarding the Proposed Project and its potential effect on Haleakala Nation Park. As indicated below, the NPS has been an active participant in the development of the Alien Species Biological Assessment and a member of the Coordinating Group on Alien Pest Species (CGAPS) formed by the Federal Aviation Administration (FAA) and the U.S. Fish and Wildlife Service (FWS).

COMMENT SK-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior NPS, Department of Interior FWS, and the Hawaii Department of

Transportation (HDOT). An outcome of the ASAP Project was the formation of the CGAPS, of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended

that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT SK-3 - Staff Levels

The Department of Agriculture has stated that their staffing levels are inadequate at the present time. At present, the HDOT is funding one of the agricultural inspection positions at Kahului Airport, and six positions statewide.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI
1580-C KAAHUMANU AVENUE
WAILUKU, HAWAII 96793

LINDA CROCKETT LINGLE
Mayor

HENRY OLIVA
Director

ALLEN SHISHIDO
Deputy Director

PLANNING & DEVELOPMENT
(808) 243-7931

April 25, 1996

David J. Welhouse
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, Hawaii 96850-0001

SUBJECT: Kahului Airport Expansion Draft EIS Review.

Dear Mr. Welhouse:

We have reviewed the subject document and note that part of the development includes expanding the existing Kanaha Beach Park facilities. Because the current park facilities are popular and heavily used by visitors and residents alike, we support expanding the park area there to meet future demands.

Since the Kanaha Beach Park improvements will be implemented during Phase II of the Kahului Airport Expansion, we have no specific comments to make at this time. We would like to participate and offer our input in the future as specific plans for the improvements become available. Should you have any questions please contact Patrick T. Matsui at 243-7931.

Sincerely,

Henry Oliva
Director

AS:PTM:GU

cc: Allen Shishido, Deputy Director
Patrick T. Matsui, Chief-Planning & Development
Gerald Unabia, Parks Project Manager
Files

a:\g\kahairpt.eis

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Hinaai

IN REPLY REFER TO
AIR-EN
97.955

August 20, 1997

Mr. Henry Oliva
Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, Hawaii 96793

Dear Mr. Oliva:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your letter of April 25, 1996, regarding the proposed Kahului Airport improvements. We look forward to working with you and your department on the expansion of Kanaha Beach Park. Your letter and this response will be appended to the Final EIS for review by the decision makers.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

JUN 24 1996

LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH HAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

June 19, 1996

Mr. David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Welhouse:

SUBJECT: Draft Environmental Impact Statement
KAHULUI AIRPORT IMPROVEMENTS
TMK:(2) 3-8-001 and 3-8-079

We reviewed the subject application and have the following comments.

1. The report states that additional flows into Kalialinui Channel will be 128 cfs, or an increase of 1.5 percent, which will have an insignificant impact. See Comment CJ-1

   Although the percentage of increase is insignificant, the quantity of the increase appears to be substantial.

2. There are two updates to the 1989 County of Maui Comprehensive Solid Waste Management Plan cited in the Draft EIS. They are the 1994 County of Maui Integrated Solid Waste Management Plan and The 1994 Solid Waste Characterization Study, Maui, Hawaii. See Comment CJ-2

3. The Draft EIS correctly states on page 3-119 that "waste oils, contaminated soils and hazardous materials are currently sent off island for disposal per U.S. EPA and State Department of Health requirements. Therefore, the hazardous wastes discussed on pages 3-120 to 3-122 and surveyed in Appendix K will be subject to private contract for authorized disposal according to State and Federal Regulations.

4. Prior to construction, the general contractor shall submit a Solid Waste Management Plan for review and approval. This plan should address construction and demolition waste disposal.

   The solid waste generated by airport operations, flight kitchens, car rental agencies and tour operators should also be addressed in the Solid Waste Management Plan emphasizing recycling, re-use and reduction. There are qualified, local recyclers and recycling services to accept materials diverted from the airport waste stream. See Comment CJ-3

5. A Map Revision is currently being processed through the Federal Emergency Management Agency (FEMA) for the project's shoreline areas within the special flood hazard area "V" zones, areas of coastal flooding with velocity (wave action). A Letter of Map Revision is being proposed for the previously constructed Kalialinui Gulch improvements. A Conditional Letter of Map Revision from FEMA will be required prior to the construction of any new improvements within Kalialinui gulch. See Comment CJ-4

Sincerely,

for CHARLES JENCKS
Director of Public Works
and Waste Management

AS:da/mt
cc: Engineering Division
Land Use and Codes Administration
Solid Waste Division
Wastewater Reclamation Division

g:\lu\cc\smith\chairp.doc

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.1231

August 20, 1997

Mr. Charles Jencks
Director
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of June 19, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT CJ-1 - Additional Flow

The additional flow and the impact determination is discussed in Section 3.13.2 of the Draft EIS.

COMMENT CJ-2 - Solid Waste Studies

The 1994 County of Maui Integrated Solid Waste Management Plan and the 1994 Solid Waste Characterization Study, Maui, Hawaii has been reviewed and applicable statements made in the Final EIS. (See attachment "solid waste")

COMMENT CJ-3 - Solid Waste

The contractor will need to follow all applicable Federal, State and County rules during the construction of the Proposed Airport Facilities.

State of Hawaii, Department of Transportation, Airports Division, has established a recycling program for the airport.

COMMENT CJ-4 - Letter of Map Revision

A letter of map revision will be completed prior to any improvements within Kalialinui gulch.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

OTHER PARTY COMMENTS

1500

480 Olinda Road
Makawao, HI 96768
May 15, 1996

copy of letter to:
David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse,

It is clear to me that the recent Environmental Impact Statement concerning the proposed lengthening of the Kahului, Maui airport runway fails to adequately address the impact of this expansion on the natural and human environments of my small island. Haleakala National Park is an International Biosphere Reserve; alien species that would arrive on the island by plane would damage, almost certainly irrevocably, the delicately balanced ecosystems of the Park. The amount of effort that has gone into restoring native species all over the island could be wiped out by the invasion of aliens. See Comment SA-1, SA-2 and SA-3

Closer to the airport itself, the Kanaha pond nature preserve could not fail to be affected by more airplane traffic; and the proposal to build a fuel pipeline from Kahului harbor to the airport immediately calls to mind oil spill disasters such as the one that occurred on Oahu just this week. See Comment SA-4 and SA-5

More planes from more distant destinations would, lacking the buffer we now have in Honolulu, increasingly stress the infrastructure of Maui, its roads, energy, its natural resources. Already having to deal with the rapidly growing number of permanent residents, this island could soon lose the beauty and harmony that make it such a desirable place to live and work. See Comment SA-6

I urge you to take a closer look at the effects this misguided expansion would have on this most beautiful place.

Sincerely,
Sandra Albers
Sandra Albers

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Hinaal

IN REPLY REFER TO
AIR-EN
97.1013

August 20, 1997

Ms. Sandra Albers
480 Olinda Road
Makawao, Hawaii 96768

Dear Ms. Albers:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 15, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT SA-1 - Effects of Proposed Project on Haleakala National Park

The Hawaii Department of Transportation (HDOT), Airports Division, and the Federal Aviation Administration (FAA) have been working in cooperation with Department of Interior National Park Service (NPS), as well as the Department of Interior Fish and Wildlife Service (FWS), other State agencies and private groups regarding the issue of inadvertent introductions of alien species onto Maui as a result of future potential increased air traffic into and out of Kahului Airport. In this regard, as a result of meetings with the NPS and the FWS, the FAA and HDOT, Airports Division, have prepared a biological assessment in cooperation with the FWS to be consistent with the requirements and procedures of 50 CFR 402.12.

The biological assessment was prepared in order to determine the potential impact of the runway extension (of the Proposed Project) on the introduction rate of Alien Species at Kahului Airport. Based upon the analysis in the biological assessment, and as necessary, appropriate mitigation measures that are reasonable, feasible and prudent have been identified. A copy of

the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS.

COMMENT SA-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior NPS, Department of Interior FWS, and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related

to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT SA-3 - Effect of Proposed Project on Ecosystems

The potential effects of the Proposed Project on biotic communities is discussed in Section 3.11 of the Draft EIS. In brief, the Proposed Project will result in the loss of Cane Field/Ruderal Border, Koa Haole/Mixed Understory, and some Open Grassland vegetative zones. These vegetative zones are primarily habitat for introduced bird species. Similarly, the Proposed Project will affect feral mammals that inhabit the agricultural

areas where the parallel runway will be constructed. The feral mammals are also introduced species.

The potential effects of the Proposed Project on the marine environment is discussed in Section 3.11.4 of the Draft EIS. As indicated, the Proposed Project will not directly impact the marine environment and there will be insignificant or no effects on water quality or runoff.

COMMENT SA-4 - Effect of Proposed Project on Kanaha Pond Wildlife Sanctuary

The potential effects of the Proposed Project on Kanaha Pond Wildlife Sanctuary are discussed in Sections 3.11.2.2 and 3.12 of the Draft EIS. As indicated in the Draft EIS, the Proposed Project will not adversely affect the Pond or the wildlife inhabiting or frequenting the Pond.

COMMENT SA-5 - Fuel Pipeline

The potential impacts of the proposed alignment of the pipeline from Kahului Harbor to the Airport Bulk Fuel Tanks, as well as mitigation measures to minimize those impacts, are discussed in the following sections of the Draft EIS: Section 3.4 (Geology, Physiography, Soils, Agricultural Potential and Earthquakes): Section 3.8 (Water Quality); Section 3.10 (Historical, Architectural, Archaeological and Cultural Resources); Section 3.13 (Hydrology Floodplain Management and Drainage): and Section 3.20 (Solid Waste, Hazardous/Toxic Waste and Waste Wash Water).

If and when the fuel pipeline is constructed, it will be installed and operated by the Airline's fuel consortium, the Hawaii Fueling Facilities Corporation. As currently proposed, the pipeline would be aligned on the ocean side (north) of Kanaha Pond. Given this location, there is a potential for a significant impact on Kanaha Pond and coastal water quality should a leak or line break occur. However, the pipeline will be designed to include a "quick flush" system, double walled pipes and leak detection sensors to minimize this risk.

The primary purpose of the proposed fuel pipeline is to reduce dependence on the fleet of fuel tanker trucks which currently convey fuel to the Airport from storage facilities at Kahului Harbor. These trucks must travel along Hana Highway, Haleakala Highway, Kala Road and Eena Street to reach the Airport. Once the trucks arrive at the Airport, they must carry fuel cargo across Runway 2-20 to reach the air carrier aircraft parking apron adjacent to the passenger terminal. This requires

clearance from the FAA Air Traffic Control Tower. It is generally accepted that fuel pipelines provide safer, more environmentally sound fuel conveyance system than that provided by tanker trucks traveling along public roads and across runways.

Due to the long-term, speculative nature of the fuel pipeline from Kahului Harbor to the Airport Storage Tanks, the EIS can only discuss potential impacts which are reasonable and foreseeable for this project at this time. If and when the pipeline project is considered for construction, additional environmental documentation will be required.

COMMENT SA-6 - Effects of Proposed Project on Maui's Infrastructure

The potential effects of the Proposed Project on Public Facilities, Infrastructure and Services, and Aviation Safety are discussed in Section 3.22 of the Draft EIS. As indicated in the Draft EIS, in general, the Proposed Project will have a beneficial effect on infrastructure components such as the road way system in and around the airport or not have an appreciable effect on infrastructure components, such as the electrical power generation, wastewater collection, treatment and disposal system, or potable water system of the island. As indicated in Section 2 of the Draft EIS, the Proposed Project is in response to existing and forecast increase in aircraft operations and passenger levels. These increases will occur regardless of the Proposed Project.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

5-16-96 1521

Dear Mr. Wellhouse,

I am writing to voice my opposition to expanding the runway at Kahului Airport. I work in the visitor industry, talking to hundreds of tourists a day. Many are repeat customers, they have been coming to the islands for years, some as long as 25 years. That's a lot of vacations.
Many visitors express their disappointment over the degradation of Maui, the increase in condos & commercialization. I suggest they contact the HVB and the State to let them know why they choose Maui over the Virgin Islands; let them know what their expectations are.
An International airport on Maui will further degrade this island in a variety of ways. The most important way is the increase in alien species being introduced to Maui. I have spoken to visitors from Guam who were in ecstacy because they were awakened by bird songs in the morning. The Brown Tree Snake has eliminated the bird population on Guam.
We can no longer take bird songs for granted on Maui. I do not want to, awaken to songless mornings on my island, thank you very much!

See Comment JA-1

See Comment JA-2

As you know, the introduction of alien bugs, insects & spiders pose a threat to our agriculture industries. More importantly, these tiny creatures threaten what is left of native ecosystems, what is left of the true Hawai'i.

Did you know, as it is, people need guides like me to provide them access to native ecosystems like those found in the Waikamoi Preserve? An average visitor cannot walk through a native rainforest of 'Ohi'a and koa trees on Maui without a guide. As it is we are struggling to protect our forests from Miconia, Banana Poka, Argentine Ants & Vespula wasps that threaten Maui's native resources. Let's not add to these problems.

The increase of direct flights to Maui also effects the quality of jobs in the islands. Through the years there have been many interisland airlines in operation (Royal Hawaiian, Mid Pacific, Mokuleia, Reeves Air). With the demise of these airlines high paying jobs have been lost. Planes landing in Honolulu increase local jobs and decrease outer island pollution with alien species. The visitors I talk to value the quality of their experience over the speed it takes to get to Maui.

See Comment JA-3

It is unfortunate people have difficulty envisioning long term impacts. As tourism is the major force in Hawai'i, the residents need to take a long look at why these islands attract visitors. The attractions are not condos, highways, & westernization. People come to experience Hawaiian plants & animals, waterfalls & sunsets. They come to experience a slower lifestyle, let's give it to them while maintaining a quality lifestyle for the residents of Maui, rural, and best of all Hawaiians. Let's help preserve & protect what is left of Hawai'i on Maui by not expanding Kahului Airport!

Sincerely, Anne Anderson

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Hinai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1014

August 20, 1997

Mr. Jim Andersen
P. O. Box 815
Makawao, Hawaii 96768

Dear Mr. Andersen:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 16, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT JA-1 - International Flights

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound

passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. (See attachment "international flights")

COMMENT JA-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future

expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included

as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT JA-3 - Economic Impacts

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation.

Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the "*most probable*" growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the "*potential maximal*" growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated

Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1255

Larry L. Anderson
4349 Laakea St.
Honolulu, HI 96818

April 30, 1996

David J Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse

I am writing you to ask you to reconsider the conclusions of the environmental impact statement regarding the airport expansion at Kahului Airport on Maui. As a military and airline pilot with more than thirty-six years of world-wide flying experience, I know that alien species can be introduced into an airport. To not address this issue is to say flights from Guam pose no threat of introducing the brown tree snake to Hawaii. If that is so, than why is Senator Inouye securing federal funds to make sure this doesn't happen? See Comment LLA-1

At the very least, you need to provide inspection and quarantine procedures for international flights. Ramp procedures at some foreign airports are not going to control loading procedures to keep pests out. The control and protective measures have to be done at Kahului airport. The ongoing costs for such controls to we taxpayers is probably no small amount. The cost of eradicating foreign species will certainly be more and probably too late. See Comment LLA-2

Sincerely,

Larry L Anderson

Larry L. Anderson

cc: O. Miyamoto

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1015

August 20, 1997

Mr. Larry L. Anderson
4349 Laakea Street
Honolulu, Hawaii 96818

Dear Mr. Anderson:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AH1011-07

Thank you for your comment letter of April 30, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT LLA-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and

candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information

was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT LLA-2 - Inspection and Quarantine Facilities

We agree that current agriculture inspection facilities are lacking at Kahului Airport. One element of the Proposed Project is the design and construction of a new air cargo facility. The HDOT, Airports Division, is committed to the State and Federal Departments of Agriculture, as well as U.S. Customs, being allowed to participate in the planning and design of this building such that they will be able to specify the types of equipment and facilities they require to adequately inspect arriving and departing air cargo, baggage and passengers. This type of facility is expected to facilitate the movement of Maui agricultural products to new and expanded markets, thereby benefitting the entire community.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1601

WEST MAUI TAXPAYERS ASSOCIATION

May 22, 1996

Mr David J Wellhouse
U S Department of Transportation
Federal Aviation Administration
Honolulu Airports District Office
Box 50244
Honolulu, HI 96850-0001

Mr Owen Miyamoto
Airports Administrator
Department of Transportation
Airports Division
400 Rodgers Boulevard, Suite 700
Honolulu, HI 96819-1880

Gentlemen:

The West Maui Taxpayers Association (WMTA) is a community organization of over 2,500 residents and property owners in West Maui. We appreciate the opportunity to comment on the draft environmental impact statement (DEIS) prepared for the proposed Kahului Airport Master Plan. We feel the DEIS is inadequate as presented.

We have spent several hours with the DEIS, and while it contains a great deal of information one thing stands out in particular: for every potential effect, the DEIS finds "no significant impact," and therefore "no mitigation measures are required."

This oft-repeated statement strikes us as problematic at best, and disingenuous at worst. It is difficult to imagine that in even the low impact scenario the DEIS envisions--of an approximately 4% annual increase in the visitor count--an additional 100,000 people on Maui per year will fail to have any effect whatever. It is difficult to imagine that given the extent of the proposed project scope and the fact that larger international and domestic planes would be flying into Kahului, no impacts on traffic, infrastructure, environment, water, health and safety, socio-economic factors, and land use would occur. We are also concerned about the issues to be resolved (1.7.2), and other issues not listed in this section such as anti-drug trafficking and alien pest interdiction plans, and how they will be staffed and funded given the state's precarious financial position.

See Comment GA-1, GA-2, GA-3, and GA-4

We regularly hear from visitors and residents in West Maui that their greatest frustrations are the fast pace of development and the increasing traffic problems which seem to accompany that growth. If these frustrations are lost or ignored in the debate, we risk damaging tourism, as well as the quality of life for residents, rather than enhancing them.

See Comment GA-5

The final EIS should make a more sincere attempt to address the many outstanding concerns, those raised both here and at the recent public hearing, in a spirit of cooperation with the community.

Thank you for your attention and consideration.

Sincerely,

Gina Aranki
Director

P.O. Box 10338 • Lahaina, Maui, Hawaii 96761 • Telephone: (808) 661-3042 • FAX: (808) 667-2077

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1012

August 20, 1997

Ms. Gina Aranki
Director
West Maui Taxpayers Association
P. O. Box 10338
Lahaina, Hawaii 96761

Dear Ms. Aranki:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 22, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT GA-1 - Growth Inducing Impacts

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by

extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;

- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to

locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the Hawaii Department of Transportation's (HDOT) "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT GA-2 - International Flight Operations

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in

limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the HDOT and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT GA-3 - Effects of Proposed Project on Island's Infrastructure

The potential effects of the Proposed Project on Public Facilities, Infrastructure and Services, and Aviation Safety are discussed in Section 3.22 of the Draft EIS. As indicated in the Draft EIS, in general, the Proposed Project will have a beneficial effect on infrastructure components such as the road way system in and around the airport or not have an appreciable effect on infrastructure components, such as the electrical power generation, wastewater collection, treatment and disposal system, or potable water system of the island. As indicated in Section 2 of the Draft EIS, the Proposed Project is in response to existing and forecast increase in aircraft operations and passenger levels. These increases will occur regardless of the Proposed Project.

COMMENT GA-4 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS.

The ASAP Project was made up of at least 20 state, federal and private organizations, The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.
The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the

Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT GA-5 - Quality of Life

Quality of life is highly subjective and the definition varies for each individual. The Proposed Project is in keeping with the transportation and tourism goals and objectives of the State and County as outlined in the State Plan and Maui County General Plan. These plans take into consideration the quality of life for the majority of residents and visitors to Hawaii.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

May 16, 1996

State Department of Transportation Airports Division
Honolulu International Airport
400 Rodgers Blvd., Suite 700
Honolulu, HI 96819

David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Office of Environmental Quality, State Department of Health
Central Pacific Plaza, 4th Floor
220 South King Street
Honolulu, HI 96713

I strongly support revising the draft EIS on the Kahului airport runway expansion to better evaluate the risks of alien species introductions which will increase due to runway expansion. The fact that the Maui County Council has pledged financial support to rid the island of pests already here demonstrates the wisdom of avoiding actions which will greatly increase the number of alien introductions. See Comment MKA-1

In recognizing the importance of protecting Maui's ecosystems, we can't fail to appreciate the increased financial cost of mitigation if we intentionally bring more pests directly to our doorstep. Our island economy relies on sound agriculture and sound tourism. Actions which denigrate agriculture and the natural setting will resoundingly damage our tourism base. Without the rich pastoral setting and our unique wealth of forest life, Maui would be nothing but another rock in the middle of the ocean.

It would be short-sighted to look at the economics of jobs today when we could be jeopardizing the very tourism base we are professing to improve. We underestimate the intellects of our visitors and one another if we assume that today's dollar would compensate for the bankruptcy of spirit and economy which will envelop the island if we allow our national heritage to be compromised by direct international flights.

Emblematic of this problem is the planting of Australian tree ferns as landscaping here at the airport. Although it's quick-growing habit was probably appealing to the landscaper who chose it, it is a plant whose air borne spores readily colonize in rainforest settings. In remote Kipahulu Valley, considerable effort has been made to prevent the spread of this pest which chokes out native species.

Although not the only problem relevant to introduction and spread of alien species, the proposed airport projects will significantly increase the number of alien species introductions which occur each year. Refusing to assess the environmental consequences of international flights on the shaky assertion that runway expansion and (increased) international flights are separate issues is a fundamental gap in logic. That decision makes the document an exercise in double-talk rather than a thorough examination of facts and potentials. It speaks of a "Damn the Torpedoes, Full-Speed Ahead" mentality which is inappropriate to this project -- a disservice to the Maui community and to the nation at large. Significant environmental values are at risk. Let's face the threats, confront them, discuss them, and responsibly review potential mitigation. See Comment MKA-2

Hawaii's cultural heritage depends on a sound environment which supports and sustains native species. Perpetuation of Hawaiian cultural and religious practices requires contact with an abundant natural system. In a growing world, it is increasingly important that these cultural experiences are shared with a wide audience so that the culture will remain a vibrant part of our society's fabric through successive generations. The alien species threat of the airport expansion are a significant cultural threat as well. See Comment MKA-1

Runway expansion is a project with far-reaching effects which encompass our entire island. We cannot face these challenges with benign ignorance. We must involve all the science and collective expertise available to review potential impacts and seriously consider their effects before the results of decisions made today become irreversible. See Comment MKA-3

Sincerely,

Marion & Karen Ardoin

Marion & Karen Ardoin
223 Wailani Road
Kula HI 96790

cc: Senator Daniel K. Akaka, 720 Hart Senate Office Building, Washington, DC 20510
Representative Patsy T. Mink, 2135 Rayburn House Office Building, Washington, DC 20515

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

IN REPLY REFER TO
AIR-EN
97.1230

August 20, 1997

Marion and Karen Ardoin
223 Ululani Road
Kula, Hawaii 96790

Dear Marion and Karen Ardoin:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 16, 1996 on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT MKA-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and

candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information

was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT MKA-2 - International Flight

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. Please refer to the attachment "international flights."

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the

HDOT and the FAA. Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. (See attachment "international flights")

COMMENT MKA-3 - Draft EIS analysis

As stated in Section 3.0 of the Draft EIS, "*To the extent practical and applicable, well-established and accepted analytic and scientific techniques have been used to evaluate potential effects of the proposed airport improvements*".

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1510

May 20, 1996

Mr. David J. Wellhouse
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

I was recently informed that the latest Environmental Impact Statement (EIS) for the proposed Kahului Airport runway extension, and the consequential internationalization of the airport, did not adequately address the question of alien species which may be introduced into the island of Maui. See Comment RA-1 and RA-2

I was also very disturbed that the National Park Service was not allowed to participate in the drafting of the EIS. Haleakala National Park is home to many endangered native species of plant and animal life on the island. As the custodian of our most vulnerable wildlife resource, The National Park Service should have been consulted about the negative impacts that a lengthened runway and consequential internationalization may cause to Haleakala National Park. See Comment RA-3 and RA-4

Unless the issue of the introduction of alien species into the island of Maui is thoroughly addressed, and other negative impacts on the quality of life (e.g. increased economic development causing a depletion or deterioration of our drinking water sources; more traffic and noise) are given more study, the runway extension should not be allowed to proceed. See Comment RA-5, RA-6, RA-7, RA-8, and RA-9

Your response to these concerns would be most appreciated.

Sincerely yours,

ROLAND ASAKURA
P.O. BOX 1833
KAHULUI, HI 96732

c: DOT - Airports Division
c: DOH - Office of Environmental Q.C.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1016

August 20, 1997

Mr. Roland Asakura
P. O. Box 1833
Kahului, Hawaii 96732

Dear Mr. Asakura:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 20, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT RA-1 - International Flights

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to

terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT RA-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the

Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the

biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attached "mitigation measures")

COMMENT RA-3 - NPS Participation in Preparation of Draft EIS

We, too, value the NPS's expertise on ecosystem issues and Haleakala National Park. Although the NPS was not formally designated as a cooperating agency for the preparation of this EIS, the FAA and HDOT, Airports Division, provided the NPS with numerous opportunities to provide input during the EIS process. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has reviewed the Draft EIS. The FAA and HDOT, Airports Division, have used the information provided by the NPS in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control.

COMMENT RA-4 - Effect of Project on Haleakala National Park

The HDOT, Airports Division, has been working in cooperation with NPS, as well as FWS, other State agencies and private groups regarding the issue of inadvertent introductions of alien species onto Maui as a result of future potential increased air traffic into and out of Kahului Airport. In this regard, as a result of meetings with the NPS and the FWS, the FAA and HDOT, Airports Division, have prepared a biological assessment in cooperation with the FWS to be consistent with the requirements and procedures of 50 CFR 402.12.

The biological assessment was prepared in order to determine the potential impact of the runway extension (of the Proposed Project) on the introduction rate of Alien Species at Kahului Airport. Based upon the analysis in the biological assessment, and as necessary, appropriate mitigation measures that are reasonable, feasible and prudent will be identified. A copy of

the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS.

COMMENT RA-5 - Quality of Life

Quality of life is highly subjective and the concept varies for each individual. The Proposed Project is in keeping with the transportation and tourism goals and objectives of the State and County as outlined in the State Plan and Maui County General Plan. These plans take into consideration the quality of life for the majority of residents and visitors to Hawaii. The social impacts of the Proposed Project are discussed in Section 3.5 and 3.6.

COMMENT RA-6 - Growth Inducing Impacts of Proposed Project

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not

part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth

inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT RA-7 - Potential Impact of Proposed Project on Infrastructure of Maui

The potential effects of the Proposed Project on Public Facilities, Infrastructure and Services, and Aviation Safety are discussed in Section 3.22 of the Draft EIS. As indicated in the Draft EIS, in general, the Proposed Project will have a beneficial effect on infrastructure components such as the road way system in and around the airport or not have an appreciable effect on infrastructure components, such as the electrical power generation, wastewater collection, treatment and disposal system, or potable water system of the island. As indicated in Section 2 of the Draft EIS, the Proposed Project is in response to existing and forecast increase in aircraft operations and passenger levels. These increases will occur regardless of the Proposed Project.

COMMENT RA-8 - Effect of Proposed Project on Traffic

The potential effects of the Proposed Project on the surface transportation system is discussed in Section 3.22.8 of the Draft EIS. As indicated therein, the Proposed Project, in itself, will not have an adverse effect on existing key intersections, and will have positive impacts on other existing intersections. Several existing intersections will be congested with or without the Proposed Project. Although the Proposed

Project will not have significant impacts on existing roadways, it will result in congested conditions at new intersections associated with new roadways constructed as part of the Project itself and on existing or planned bike routes. Several mitigation measures will be implemented to alleviate or eliminate these adverse impacts, including the widening of some roadways, the construction of new turn lanes and rerouting the planned bikeway. The mitigation measures adopted will be consistent with federal, state and local regulations and will be implemented by the corresponding federal, state and local agencies.

COMMENT RA-9 - Effect of Proposed Project on Noise

The potential impacts of the Proposed Project on the noise characteristics of the project area and surrounding environs is discussed in Section 3.2 of the Draft EIS. Airport and aircraft noise, as well as noise generated during construction and that generated by surface traffic, were analyzed for the EIS.

As indicated in the Draft EIS, there are no significant noise impacts due to the proposed project and no mitigation measures are warranted. The State should pursue the abatement and mitigation measures set forth in the Kahului Airport Noise Compatibility Program to reduce existing incompatible land uses within the Airport's environs. With regard to traffic noise, the increase in traffic along Dairy Road will cause a significant increase in ground vehicle noise. Although this impact may be greater without the Proposed Project, consideration should be given to reasonable and feasible mitigation measures. A reasonable and feasible mitigation measure suggested is the construction of a noise barrier along the lots affected by the increased traffic noise. This measure would be implemented if there is consensus among the homeowners and property owners.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

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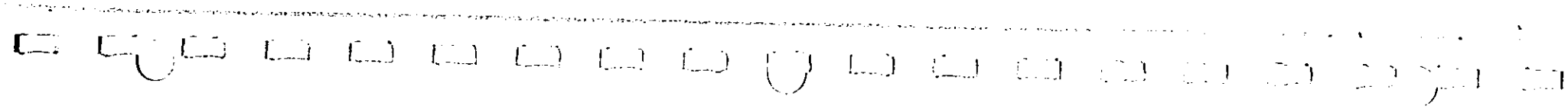

1676

The Baileys
RR2 Box 126
Kula, Hi 96790

May 20, 1996

David Swelhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu Hi 96850

There are many reasons why the DEIS for Maui's airport should be scratched. It all boils down to misinformation, misinterpretation of data, poor research, ignorance of our community, deception (as in the Kanaha Pond report etc.) and woefull inadequacy:

Maui's agriculture is in great danger with this proposed expansion an ultimate internationalization of Kahului Airport. Key facilities such as quarantine stations and sealed inspection buildings are either deficient or non-existant. Haleakala Park is significantly threatened by this expansion. It is frightening to think that DOT is more than willing to proceed with putting agriculture and the Park on a course of destruction. See Comment BB-1 See Comment BB-2 See Comment BB-3

DOT (and the DEIS) has failed to acknowledge the severe adverse impacts that international airports create. An increase of aproximately four (4) million travelers, and who knows how many extra permanent residents (you ignored this one completely) plus a minimum of 120% increase in military flights is terrifing. This creates degredation of community, our environment and lots of noise. It leads to increases in the cost of food and homes (own or rent) and also increases in taxes to pay for infrastructure throughout Maui - roads, sewers, water, fire dept's, police, schools, county employees & benefits etc. Who will pay for this? We will. The income from this airport will never come close to the costs. Even the tourists don't want it! As evidenced by your studies (vol II) and my own (I have been in a visitor related business for 25 years.) See Comment BB-4 See Comment BB-5 See Comment BB-6, BB-7 and BB-8

These and other inevitabilities have not been studied by DOT, and yet they are at the center of the problem. It's as tho you proceeded to write this 22 lbs & 9 oz document with blinders on, hoping no one would notice or care. See Comment BB-9

But we do care. We love our Island, our homes, community, the land. Maui is precious to us and to our children's future. You have not done your job and you know it. My family (the Bailey's are a large family) plans to persue this crisis and support any fight to preserve our aina.

Please send me a copy of the final EIS if and when it becomes available.

Sincerely

Bren Bailey

& Fred Bailey, Zachary Bailey, Luke Bailey, Makani Bailey, Kiho Bailey, Roy Bailey etc etc.

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.997

August 20, 1997

Ms. Bren Bailey
RR2 Box 126
Kula, Hawaii 96790

Dear Ms. Bailey:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 20, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT BB-1 - Internationalization of Kahului Airport

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

I cernational service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to

terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attached "international flights")

COMMENT BB-2 - Inspection Facilities

We agree that current agriculture inspection facilities are lacking at Kahului Airport. One element of the Proposed Project is the design and construction of a new air cargo facility. The HDOT, Airports Division, is committed to the State and Federal Departments of Agriculture, as well as U.S. Customs, being allowed to participate in the planning and design of this building such that they will be able to specify the types of equipment and facilities they require to adequately inspect arriving and departing air cargo, baggage and passengers. This type of facility is expected to facilitate the movement of Maui agricultural products to new and expanded markets, thereby benefitting the entire community.

COMMENT BB-3 - Effect of Proposed Project on Haleakala National Park

The HDOT, Airports Division, and FAA have used the environmental analysis, information and proposals received from the National Park Service (NPS) to the maximum extent possible in the preparation of the Draft EIS. In addition, the FAA as well as the HDOT, Airports Division, have been working in cooperation with NPS, as well as Department of Interior Fish and Wildlife Service (FWS), other State agencies and private groups regarding the issue of inadvertent introductions of alien species onto Maui as a result of future potential increased air traffic into and out of Kahului Airport. In this regard, as a result of meetings with the NPS and the FWS, the FAA and HDOT, Airports Division, have prepared a biological assessment in cooperation with the

FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment was prepared in order to determine the potential impact of the runway extension (of the Proposed Project) on the introduction rate of Alien Species at Kahului Airport. Based upon the analysis in the biological assessment, and as necessary, appropriate mitigation measures that are reasonable, feasible and prudent have been identified. A copy of the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT BB-4 - Potential Population Growth

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc., beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;

- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the "*most probable*" growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the "*potential maximal*" growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT BB-5 - Potential Aircraft Generated Noise

The potential impacts of the Proposed Project on the noise characteristics of the project area and surrounding environs is discussed in Section 3.2 of the Draft EIS. Airport and aircraft noise, as well as noise generated during construction and that generated by surface traffic, were analyzed for the EIS.

As indicated in the Draft EIS, there are no significant noise impacts due to the proposed project and no mitigation measures are warranted. The State should pursue the abatement and mitigation measures set forth in the Kahului Airport Noise Compatibility Program to reduce existing incompatible land uses within the Airport's environs. With regard to traffic noise, the increase in traffic along Dairy Road will cause a significant increase in ground vehicle noise. Although this impact may be greater without the Proposed Project, consideration should be given to reasonable and feasible mitigation measures. A reasonable and feasible mitigation measure suggested is the construction of a noise barrier along the lots affected by the increased traffic noise. This measure would be implemented if there is consensus among the homeowners and property owners.

COMMENT BB-6 - Potential Effects of Proposed Project on Infrastructure

The potential effects of the Proposed Project on the airport area infrastructure are discussed in detail in Section 3.22 of the Draft EIS. Additionally, a detailed analyses of the infrastructure requirements for Kahului Airport is presented in

Appendix L to the Draft EIS. A traffic impact report is presented in Appendix M and P, and an aviation safety analysis is presented in Appendix N.

In general, based on the various analyses performed, the Proposed Project will have positive, insignificant or negligible effects on the water and wastewater systems, telecommunications systems, police, fire and security services, health care services, schools, and recreational facilities of the island. Similarly, for the most part, the proposed roadway improvements will result in positive effects on the roadway system in the vicinity of the airport. There will be significant traffic effects at some intersections, but these effects will occur with or without the Proposed Project as a result of natural growth of the island.

COMMENT BB-7 - Airport Income

The funds used to develop State airports are derived from landing fees, bond issues and the U.S. Airport and Airway Development Act. They are not derived from the State's general fund or other sources. The HDOT, Airports Division, is one of the few State government run operation that generates income which completely off-sets their expenditures. The HDOT, Airports Division, would not undertake any airport project unless we were certain airport revenues would be adequate to recover the costs of those projects. An analysis of the cost of the airport improvements was performed in the SIAR presented in Appendix E and summarized in Section 3.5 of the Draft EIS. The HDOT may request funding from the Intermodal Surface Transportation Efficiency Act though the Federal Highways Administration for the construction of the Airport Access Roadway.

COMMENT BB-8 - Purpose and Need for the Proposed Project

The purposes and need for the Proposed Project are described in Section 2.3 of the Draft EIS. As indicated, the purposes of the Proposed Project are to (1) create an airport infrastructure which will support the present and future goals and objectives of the county and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the year 2010 in a manner which accommodates existing and forecast aviation demands. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands.

COMMENT BB-9 - Adequacy of EIS

As stated in Section 1.0, the EIS is being prepared in compliance to the National Environmental Policy Act and the Hawaii Revised Statutes, Chapter 343. One of the purposes of the Draft EIS is to solicit public and government agency input into the accuracy and adequacy of the descriptions of the potential environmental effects of the Proposed Project. In this regard, descriptions that are believed to require additional information are identified. That information is then generated and included in the Final EIS such that the decision makers have sufficient information on the environmental effect of the Proposed Project, and to integrate with other social, political and economic information in their decision making process. The EIS for the Proposed Project is at this juncture of the process, and we appreciate receiving your comments for incorporation into the Final EIS.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1572

May 20, 1996

State Department of Transportation Airports Division
Honolulu International Airport
400 Rodgers Blvd., Suite 700
Honolulu, HI 96819

David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Office of Environmental Quality, State Department of Health
Central Pacific Plaza, 4th Floor
220 South King Street
Honolulu, HI 96713

We, the Sisters of Hula Halau Wehiwehi o Leilehua, object to the Draft EIS on proposed runway expansion. We believe that the document does not adequately address the cultural, natural, and economic consequences that the project would have on our island home. See Comment GB-1

Maui is unique among the islands. It includes several of the most pristine remaining rainforest communities of all Hawai'i.

We believe that the airport expansion project would result in increased alien species introductions. Because of Kahului's location, tradewinds could readily disperse these pests inward. Kona winds and storms would complete the job for wind-borne insects, fungus, and seeds – island-wide. Other pests can readily escape into the surrounding cane fields and natural areas surrounding the airport and underneath aircraft approach paths upon arrival. In contrast to Honolulu Airports surroundings of concrete or ocean, introduced organisms would find Maui a hospitable place. Harmful species could become widespread and irreversibly established before they are even detected. See Comment GB-2

There are many economic and spiritual reasons to protect our environment. We add to those our heartfelt convictions that Hawaii's people need our natural systems to support our cultural practices. Whether or not our families have Hawaiian blood, we cherish the culture for the wisdom and joy it imparts. It is vitally important to us that these experiences are not taken away from us. We cannot practice the hula without plants, participate in traditional crafts without materials, or enjoy the Hawaiian experience without the native birds' songs.

We urge you to re-write the EIS to adequately address our concerns and to clearly identify the threats to our lifestyle which this project represents.

Sincerely,

Gordean Bailey

Gordean Bailey
Kumu Hula
RR2, Box 325
Kula, HI 96790

and See Attached Sheets for Signatories. Original signatures sent to FAA, HNL.

cc: Senator Daniel K. Akaka, 720 Hart Senate Office Building, Washington, DC 20510
Representative Patsy T. Mink, 2135 Rayburn House Office Building, Washington, DC 20515
Governor, State of Hawai'i, c/o OEQC, 220 S. King St., 4th Fl., HNL, HI 96813
FAA, 800 Independence Ave., SW, Washington, DC 20591
Brian Ishii, Edward K. Noda & Assoc., 615 Piikoi St., Ste. 300, Honolulu, HI 96814

We request revision of the Kahului Airport Expansion Draft EIS and oppose the project based on cultural, environmental, and economic concerns:

Name	Address (optional)
Clare V. Butchart	102 Miner Place, Makawao Hi 96;
Kare Butchart	102 miner pl. Makawao 96;
Leanne Poffenbarger	
Tracy Fujitani	
Patty Davis	271 A Waipoli Rd Kula 96790
Chandra Davis	
Dr. Renate Gassmann-Duvall	534 Olinda Rd. Makawao HI 96768
TRACY C. BUTCHART Tracy C. Butchart	237.1 Kula Hwy Kula, Hi. 96790
Janice Simpson	P.O. Box 891
Jamie Simpson	Haiku, HI 96708
Suganelha Black	PO 1073 Kula 96790
Pamela J. Mitchell	131A Kulalani Dr. Kula Hi. 96790
Laurie Lipp	545 P OLINDA RD MAKAWAO 96

We request revision of the Kahului Airport Expansion Draft EIS and oppose the project based on cultural, environmental, and economic concerns:

Name	Address (optional)
Hayley A. Ramos	
Iku Kekumanui-Tyje Ramos	736-F Ponoi Pl 96768 Makawao Hi.
Donelle Bancaco	RR2 232 A Kula Hi. 96790
Mandy R. Lindsey	255 B Kula Hi. 96768
Liana Takamine	
Cynthia H. Takamine	83-C Polipoli Rd Kula, Hi 96790
Anna Duvall	534 Olinda Road Makawao HI 96768
Karen B. Quill	1186 Opu Place, Kula HI 96790
Rii Conger	PO Box 563 Kula, Hi 96790
Annie Haier	234 Holomatani Pl. Kula, Hi 96790
Virginia Parker	234 A Holomatani Pl. Kula, Hi. 96790
Suzanne Hark	P.O. Box 726 Makawao, Hi 96768
Patricia L Rohrer	P.O Box 8 Makawao Hi 96768
John V. Bailey	RR2 Box 325 Kula Hi 96790

We request revision of the Kahului Airport Expansion Draft EIS and oppose the project based on cultural, environmental, and economic concerns:

Name	Address (optional)
Karen Knox-Chinery	374 Kinaole Circle, Kihei, HI 96753
Karen Ardon	223 Ululani Road Kula 96790
Zoe Miner	1140 Nomihoku Pl, Haiku, 96708
Patricia M. Dolles	150 Lanikai Haiku 96708
Keith McGrary	138 Holopuni Rd. Kula 96709
Kris Holmes	322 Alae Rd. Kula, HI 96790
Aloha Bunger	953 HIWALANI CP. PUKALANI HI 96768
Margi Nolan	P.O. Box 108 Paia. HI 96779
Brigitte Peiller	PO Box 600 HAIKU 96708 HI MAUI

We request revision of the Kahului Airport Expansion Draft EIS and oppose the project based on cultural, environmental, and economic concerns:

Name	Address (optional)
Joanie Lim	222 Ululani Rd - Kula, Hi 96790
Lisa DeCoite	P.O. Box 29 Kula, HI. 96790
Barbara J. Karlen	RR I Box 509 Kula HI 96790
Jacqueline R. Aquino	RT. 1 Box 472-A Kula 96790
Rome Lee	RT. 1, Box 472-A Kula, 96790
Mercy Kapp	RR1 Box 501, Kula, Hi. 96790

We request revision of the Kahului Airport Expansion Draft EIS and oppose the project based on cultural, environmental, and economic concerns:

Name	Address (optional)
VIVIANA C-VALLS	R-R-4 Box 790 KULA 96790
Eleanor Dudley	150A S. Lanikai Place, Haiku 96708

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1017

August 20, 1997

Ms. Gordean Bailey
RR 2, Box 325
Kula, Hawaii 96790

Dear Ms. Bailey:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 20, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT GB-1 - Effects of Proposed Project on Cultural, Natural and Economic Factors of Maui

The Draft EIS was prepared in compliance with the National Environmental Policy Act and Hawaii's Environmental Policy Act Chapter 343, Hawaii Revised Statutes. As such, it describes as accurately as possible, the potential environmental, social, economic and cultural effects of the proposed Kahului Airport improvements. As indicated in the Draft EIS, for most environmental, social, economic and cultural issue areas, the Proposed Project will have insignificant negative effects or positive effects on the Island. Also, as indicated in the Draft EIS (see Section 2.3), the purposes of the Proposed Project are to (1) create an airport infrastructure which will support the present and future goals and objectives of the county and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the Year 2010 in a manner which accommodates existing and forecast aviation demands. That is, the Proposed Project is in response to existing aviation needs, and forecast increases in aviation activity and passenger levels. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands.

COMMENT GB-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the

Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui, as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1567

20 May 1996

Owen Miyamoto
Department of Transportation
Honolulu International Airport
400 Rodgers Blvd. #700
Honolulu, HI 96819

Sir:

I am opposed to the lengthening of the Kahului runways. The EIS was woefully inadequate in addressing the concerns of the introduction of alien species. If our unique precious environment is destroyed the longest runway on earth won't be enough to attract visitors. It is appalling that the Superintendent of Haleakala National Park was not consulted.

See Comment BB-1

See Comment BB-2

We are experiencing traffic problems. Our hotels are not full. Maui does not need a huge influx of travellers from exotic destinations bringing in potentially devastating pests.

See Comment BB-3 & BB-4

It is sad and disappointing that corporate interests usually overrule the wishes of the people. The majority of us wish to keep Maui the best. The heart must decides. Please help.

Aloha,

Barbara Baillie

Barbara Baillie
Kula, Maui

P.S. When was the last time you enjoyed the grandeur of our Haleakala Park? No one could fathom it being ruined!

BENJAMIN J. CAYETANO
GOVERNOR

KAZUHIRA SHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.711

August 20, 1997

Ms. Barbara Baillie
210 Wahelani Road
Kula, Hawaii 96790

Dear Ms. Baillie:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 20, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT BB-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the Hawaii Department of Transportation (HDOT) is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is

available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attached "mitigation measures")

COMMENT BB-2 - NPS Participation in Preparation of Draft EIS

We, too, value the NPS's expertise on ecosystem issues and Haleakala National Park. Although the NPS was not formally designated as a cooperating agency for the preparation of this EIS, the FAA and HDOT, Airports Division, provided the NPS with numerous opportunities to provide input during the EIS process. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has reviewed the Draft EIS. The FAA and HDOT, Airports Division, have used the information provided by the NPS in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control.

Comment BB-3 - Traffic Impacts

Existing and future surface transportation and traffic impacts are discussed in Section 3.22.8 of the Draft EIS. Based on the analyses conducted, none of the existing intersections and roadways would experience significant adverse effects as a result of the Proposed Project. The Proposed Project, when compared to the No-Action Alternative, creates measurable positive impacts at

certain intersections. However, with or without the Proposed Project, several existing intersections will be in excess of the planned capacity and/or will result in unacceptable service levels.

COMMENT BB-4 - Growth Inducing Impacts

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS. Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Econonic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc., beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated. The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth. Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced

situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport. Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts.

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the "*most probable*" growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the "*potential maximal*" growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results. Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and

8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

AIRPORT FRAGMENTATION

Two crows were fighting, and they meant business. They were flopping about on the ground with their wings locked, and their sharp, black beaks were tearing at each other. One or two of their companions were cawing at them from a nearby tree, and suddenly the whole neighborhood of crows were there, making an awful noise, some wanting to stop the fight and others wanting to join the fight. There must have been dozens of them, but in spite of their anxious and angry calls, the fight went on.

Isn't it time we came together in our differences on what is best for Maui? So that seeing the total picture, not just that part of the picture that promotes our biases, prejudices, ideals and beliefs, we are able to take total action. Fragmentation, or seeing only part of the picture, hich is the way we are now living, is taking the parts and hoping by putting these various parts together that we can make the whole.

Is it true that we are not really interested in the people on Maui, but in ideologies, schemes and Utopias? Is it true that we are actually concerned, not with helping the people, but with advancing the plan or the organization which asserts to help the people? Is this where our real interest lies?

In order to have harmony and love, the desire for success, for power and position must cease. One cannot see the whole of anything if one's mind is clouded with greed, ambition and fame. One can't have it both ways. To argue whether the runway should be extended or remain the same, to shut out all activities which have no relationship to the one you have chosen, will create only confusion.

It appears that neither side has moved away from their conclusions. Both sides came to the meeting with their conclusions and both sides left with their conclusions. And, to think from conclusions is not to think at all.

Dawn Balog
Kapalua

Dawn Balog
500 Bay Drive 35-B
Kapalua, Hi 96761
665-0507

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.810

August 20, 1997

Ms. Dawn Balog
500 Bay Drive, No. 35-B
Kapalua, Hawaii 96761

Dear Ms. Balog:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comments on the Draft EIS on the Kahului Airport Improvements. Your concerns have been noted.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1561

Charles Bigelow
322 Alae Road
Kula, Hawaii 96790

20 May 1996

David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Welhouse:

On May 8, I attended the public hearing on the Draft Environmental Impact Statement for the Kahului Airport Expansion.

After hearing the testimony and reviewing relevant sections of the DEIS, I support the **"NO ACTION"** alternative to runway expansion.

I am opposed to the runway expansion for the following reasons:

1. Danger of introduction of alien pests to Maui via increased air traffic, especially from tropical regions, but also from the mainland U.S. Alien insects, plants, reptiles, mollusks, and other flora and fauna could harm Maui's natural ecosystems in Haleakalaa Park and other Maui areas, and also injure Maui's diversified agricultural and horticultural industries. The DEIS does not adequately address this crucial problem, and the amelioration proposals are inadequate. See Comment CB-1
2. Danger of pollution to Kanaha Pond from nearby shipping and storage of jet fuel and other chemicals, and general noise disturbance to the rare bird life of Kanaha Pond from increased overflights. See Comment CB-2 and CB-3
3. Increased automobile traffic congestion and accidents on Maui's already inadequate highways, resulting from increased visitor traffic, and general increased burden on Maui's inadequate infrastructure, including water and sewage treatment, from increased visitor populations. See Comment CB-4
4. Increased social problems and crime resulting from increases in drug importation and criminal traffic from the U.S. and abroad. See Comment CB-5
5. Increased possibility of introduction of serious human diseases, such as dengue fever and malaria, which could more easily become established on Maui through infected passengers on direct flights from tropical countries. See Comment CB-6

Sincerely yours,

Charles Bigelow

Charles Bigelow

cc. Owen Miyamoto
Department of Transportation
Airports Division
Honolulu International Airport

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. HINAI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1018

August 20, 1997

Mr. Charles Bigelow
322 Alae Road
Kula, Hawaii 96790

Dear Mr. Bigelow:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 20, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT CB-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and

candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations, general economic conditions, and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information

was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT CB-3 - Fuel Line

The potential impacts of the proposed alignment of the pipeline from Kahului Harbor to the Airport Bulk Fuel Tanks, as well as mitigation measures to minimize those impacts, are discussed in the following sections of the Draft EIS: Section 3.4 (Geology, Physiography, Soils, Agricultural Potential and Earthquakes): Section 3.8 (Water Quality); Section 3.10 (Historical, Architectural, Archaeological and Cultural Resources); Section 3.13 (Hydrology Floodplain Management and Drainage): and Section 3.20 (Solid Waste, Hazardous/Toxic Waste and Waste Wash Water).

If and when the fuel pipeline is constructed, it will be installed and operated by the Airlines' fuel consortium, the Hawaii Fueling Facilities Corporation. As currently proposed, the pipeline would be aligned on the ocean side (north) of Kanaha Pond. Given this location, there is a potential for a significant impact on Kanaha Pond and coastal water quality should a leak or line break occur. However, the pipeline will be designed to include a "quick flush" system, double walled pipes and leak detection sensors to minimize this risk. The primary purpose of the proposed fuel pipeline is to reduce dependence on the fleet of fuel tanker trucks which currently convey fuel to the Airport from storage facilities at Kahului Harbor. These trucks must travel along Hana Highway, Haleakala Highway, Kala Road and Eena Street to reach the Airport. Once the trucks arrive at the Airport, they must carry fuel cargo across Runway 2-20 to reach the air carrier aircraft parking apron adjacent to the passenger terminal. This requires clearance from the FAA Air Traffic Control Tower. It is generally accepted that fuel pipelines provide safer, more environmentally sound fuel conveyance system than that provided by tanker trucks traveling along public roads and across runways.

Due to the long-term, speculative nature of the fuel pipeline from Kahului Harbor to the Airport Storage Tanks, the EIS can only discuss potential impacts of this project in general terms. If and when the pipeline project is considered for construction, additional environmental documentation is required.

COMMENT CB-3 - Effect of Proposed Action on Kanaha Pond Birdlife

The potential effects of increased air traffic over Kanaha Pond Wildlife Sanctuary are discussed in Section 3.11.2. In summary, the Draft EIS concluded that there will be no impact on the birdlife in the Kanaha Pond Wildlife Sanctuary. Several studies were completed, including a study was conducted to determine the effect, if any, of increased nighttime flights and lighting on the endangered species, namely the Hawaiian Stilt, inhabiting or frequenting the Pond. The study showed no correlation between the Hawaiian Stilt's responses and aircraft overflights. In addition, no shorebirds or water birds were startled by the aircraft activity. The study also looked at other relevant studies which showed that certain species will adapt to loud noises including aircraft overflights.

COMMENT CB-4 - Increased Automobile Congestion

.e potential effects of the Proposed Project on the surface transportation system is discussed in Section 3.22.8 of the Draft EIS. As indicated therein, the Proposed Project, in itself, will not have an adverse effect on existing key intersections, and will have positive impacts on other existing intersections. Several existing intersections will be congested with or without the Proposed Project. Although the Proposed Project will not have significant impacts on existing roadways, it will result in congested conditions at new intersections associated with new roadways constructed as part of the Project itself and on existing or planned bike routes. Several mitigation measures will be implemented to alleviate or eliminate these adverse impacts, including the widening of some roadways, the construction of new turn lanes and rerouting the planned bikeway. The mitigation measures adopted will be consistent with federal, state and local regulations and will be implemented by the corresponding federal, state and local agencies.

COMMENT CB-5 - Increased Social Problems

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport

Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts), Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts), and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc., beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities, as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project.
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT CB-6 - Increased Possibility of Introduction of Human Diseases

The potential effects of the Proposed Project on the health care facilities of Maui are discussed in Section 3.22.5 of the Draft EIS. As indicated in the Draft EIS, the Proposed Project is expected to have insignificant effects on the health care facilities of the island.

The Proposed Project is in response to existing and forecast increases in aviation activity and passenger levels. These forecast increases will occur regardless of the proposed Project. Therefore, if an increase in human diseases were to occur, it would occur whether or not the Proposed Project moves forward.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1599

TO: Mr. David J. Welhouse, F.A.A., Honolulu
FROM: Pat Bily, P.O.Box 23, Kula, Hi. 96790
RE: Draft EIS for Kahului Airport expansion
c.c. Owen Miyamoto, HDOT; Marsh Wienert, MVB

Dear Mr. Welhouse,

I'm presenting you with my written testimony on the topic of the Draft EIS for the Kahului Airport expansion, as I was unable to attend the public meeting. Granted there were many others, proponents and opponents to this issue, that also did not attend the May 8 session. However, it must be obvious to you that the overwheming majority of Maui citizens are against said expansion. If you have been doing your homework by reading and hearing what the general public on Maui has to say about this matter (and NOT just the select few businesses that stand to profit from this overpriced development), you can easily come to the conclusion that Maui people are simply 'not ready' for this move, just as they were years ago. Serious questions continue to unanswered at this point of the procedings and I believe the movement in favor of the expansion has shot itself in the foot again with such a shabby EIS. Apparently, no lesson was learned from the last attempt's ignoring infrastructure and pest concerns Many of my neighboring farmers in Kula are pessimistic about the control the State Dept. of Transportation has on their lives. They already feel concern for the cutbacks affecting the State Dept. of Agiculture (making them impotent in controlling the spread of agricultural pests from one island to the next), and cannot understand the state spending more money in its Dept. of Transportation for an objective that will only invite more agricultural pests. The majority that I know are not swayed by the allure of more available freight space for their products. This misleading promise was also made years ago, when the first leg of airport expansion was launched...flower growers are still not able to compete well with mainland growers and importers. Since then, we have been barraged with at least 6 new major insect pests, as well as virus, that only make our exporting more difficult and unlikely to pass USDA inspection. Be honest with us and yourself...do you really believe this trend will get better after exposing Maui to a greater vulnerability from new agricultural pests? I know many say agriculture is on its' way out in this state; many of us rural residents still cling to the lifestyle of the past when Hawaii, especially upcountry Maui, was naturally associated with farming and ranching. So why don't you just help put this dying tradition out of its' misery, and push this airport expansion through? Why not, I'm sure there will be plenty of alternative economic bases that could flourish in upcountry Maui, such as accomodating the thousands more tourists this expansion will bring to the island (I'm being sarcastic). Do you really believe we are ready to turn our farms into hotels and golf courses? Even if it was realistic to a viable economy? The small percentage of jobs and short term economic boom you seek from this expansion will be a long term disaster. Once Maui starts to look more like Honolulu, guess what-the tourists that were attracted to this islands' beauty will find another destination!

See Comment PB-1

See Comment PB-2 and PB-3

See Comment PB-4

Sincerely,
Pat Bily

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1019

August 20, 1997

Mr. Pat Bily
P. O. Box 23
Kula, Hawaii 96790

Dear Mr. Bily:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT PB-1 - Purpose of Proposed Project

As indicated in the Draft EIS (see Section 2.3) the purposes of the Proposed Project are to (1) create an airport infrastructure which will support the present and future goals and objectives of the county and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the Year 2010 in a manner which accommodates existing and forecast aviation demands. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands.

COMMENT PB-2 - Effects of Proposed Project on Island's Infrastructure

The potential effects of the Proposed Project on Public Facilities, Infrastructure and Services, and Aviation Safety are discussed in Section 3.22 of the Draft EIS. As indicated in the Draft EIS, in general, the Proposed Project will have a

beneficial effect on infrastructure components such as the road way system in and around the airport or not have an appreciable effect on infrastructure components, such as the electrical power generation, wastewater collection, treatment and disposal system, or potable water system of the island. As indicated in Section 2 of the Draft EIS, the Proposed Project is in response to existing and forecast increase in aircraft operations and passenger levels. These increases will occur regardless of the Proposed Project.

COMMENT PB-3 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the

Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT PB-4 - Growth Inducing Impacts

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation.

Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the "*most probable*" growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the "*potential maximal*" growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

13 MAY 96 1540

OWEN MIYAMOTO
DEPT. OF TRANSPORTATION, AIRPORTS
HONOLULU INTERNATIONAL AIRPORT
400 ROGERS BLVD #700
HONOLULU, HI 96819

Dear Mr Miyamoto,

My name is Lillian Blom and I am a small farmer on Maui. I recently attended the public hearing held at gate 39 in Kahului Airport at which a number of inadequacies with the Draft EIS for the proposed Kahului Airport Expansion Project were brought to light.

I have grave concerns about the proposed fuel line between the tanks at Kahului Harbor and the airport. How on earth can you consider laying this line beneath Kanaha Bird Sanctuary? Do you really believe the threat of an oil spill, and the damage done in cleaning it up to constitute "no significant impact"?! These are ENDANGERED SPECIES! How do you propose to install the line w/out damaging the Sanctuary? Surely, the recent spill in Pearl Harbor didn't escape your notice. Will there be state of the art computer equipment with a system to detect spills and shut off the flow before there is enough to ~~be consider~~ constitute a "significant impact"? How many dead birds are considered "significant"?

See Comment LB-1

See Comment LB-2

A friend recently returned from TAHITI with stories of biting sandflies. Newly introduced to that once lovely place, with no natural predators, this little insect has proliferated wildly, and now the beaches are uninhabitable from DAWN till DUSK. I shudder to think how quickly the bottom would drop out of our economy if the sandflea came to Maui! It's been difficult enough for Maui's Miconia eradication project to get adequate funding and VOLUNTEERS TO GO INTO the forests of EAST Maui to pull out this rapidly spreading nightmare. Can you imagine trying to eradicate fleas? - or snakes?

See Comment LB-3

In light of these not-so-remote possibilities, the failure of the EIS to fully outline specifics for inspection and quarantine facilities is beyond me.

Another of my concerns is the impact fifteen (plus) years of heavy road construction in downtown Kahului would have on Maui's commuter population, and the impression it would make on arriving and departing tourists. Why aren't delays, gridlock, and the stress caused by traffic, noise and air pollution fully evaluated. This type of social impact reduces the Quality of Life for all of us on Maui, and reduces the appeal we have to attract visitors to return. You can't keep forcing uncontrolled growth & more and more urbanization then expect to continue to attract visitors to what is marketed as a laid back, fun, Pacific Island Paradise. What they find here is in fact just what they travelled 10 HOURS to ESCAPE. Why duplicate Honolulu? Why duplicate L.A.? CAN'T YOU SEE THE VALUE ($$$) of our uniqueness?

See Comment LB-4, LB-5, LB-6, LB-7, and LB-8

I get the feeling the attitude surrounding this Project is not one of forethought & careful consideration, but merely selfish, self-serving shortsightedness. You're obviously champing at the bit to start handing out the construction contracts and lighting your fat cigars, but the CITIZENS of MAUI DONT AGREE.

We need to see a responsible, honest, EIS which clearly outlines how these issues are to be dealt with throughout the ENTIRE length of this Proposed airport expansion, NOT JUST PHASE 1. "We will cross that bridge when we come to it" is not good enough. The people of Maui are smarter than you think. Back to the old drawing board.

See Comment LB-9

Sincerely,

Lily Blom

Lillian Blom
P.O. Box 1135
Haiku, HI 96708
808 573-0542

cc: DAVID HELMHOUSE FAA HONOLULU DISTRICT OFFICE
OFFICE of Environmental Quality Control State Dept of Health

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1020

August 20, 1997

Ms. Lillian Blum
P. O. Box 1135
Haiku, Hawaii 96708

Dear Ms. Blum:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 18, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT LB-1 - Fuel Line

The potential impacts of the proposed alignment of the pipeline from Kahului Harbor to the Airport Bulk Fuel Tanks, as well as mitigation measures to minimize those impacts, are discussed in the following sections of the Draft EIS: Section 3.4 (Geology, Physiography, Soils, Agricultural Potential and Earthquakes): Section 3.8 (Water Quality); Section 3.10 (Historical, Architectural, Archaeological and Cultural Resources); Section 3.13 (Hydrology Floodplain Management and Drainage): and Section 3.20 (Solid Waste, Hazardous/Toxic Waste and Waste Wash Water).

If and when the fuel pipeline is constructed, it will be installed and operated by the Airline's fuel consortium, the Hawaii Fueling Facilities Corporation. As currently proposed, the pipeline would be aligned on the ocean side (north) of Kanaha Pond. Given this location, there is a potential for a significant impact on Kanaha Pond and coastal water quality should a leak or line break occur. However, the pipeline will be designed to include a "quick flush" system, double walled pipes and leak detection sensors to minimize this risk. The primary purpose of the proposed fuel pipeline is to reduce dependence on

the fleet of fuel tanker trucks which currently convey fuel to the Airport from storage facilities at Kahului Harbor. These trucks must travel along Hana Highway, Haleakala Highway, Kala Road and Eena Street to reach the Airport. Once the trucks arrive at the Airport, they must carry fuel cargo across Runway 2-20 to reach the air carrier aircraft parking apron adjacent to the passenger terminal. This requires clearance from the Federal Aviation Administration (FAA) Air Traffic Control Tower. It is generally accepted that fuel pipelines provide safer, more environmentally sound fuel conveyance system than that provided by tanker trucks traveling along public roads and across runways.

Due to the long-term, speculative nature of the fuel pipeline from Kahului Harbor to the Airport Storage Tanks, the EIS can only discuss potential impacts of this project in general terms. If and when the pipeline project is considered for construction, additional environmental documentation is required. (See response to comment regarding "Segmentation," below).

COMMENT LB-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the

biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT LB-3 - Inspection and Quarantine Facilities

We agree that current agriculture inspection facilities are lacking at Kahului Airport. One element of the Proposed Project is the design and construction of a new air cargo facility. The HDOT, Airports Division, is committed to the State and Federal Departments of Agriculture, as well as U.S. Customs, being allowed to participate in the planning and design of this building such that they will be able to specify the types of equipment and facilities they require to adequately inspect arriving and departing air cargo, baggage and passengers. This type of facility is expected to facilitate the movement of Maui agricultural products to new and expanded markets, thereby benefitting the entire community.

COMMENT LB-4 - Traffic Impacts

The potential effects of the Proposed Project on the surface transportation system is discussed in Section 3.22.8 of the Draft EIS. As indicated therein, the Proposed Project, in itself, will not have an adverse effect on existing key intersections, and will have positive impacts on other existing intersections. Several existing intersections will be congested with or without the Proposed Project. Although the Proposed Project will not have significant impacts on existing roadways, it will result in congested conditions at new intersections associated with new roadways constructed as part of the Project itself and on existing or planned bike routes. Several mitigation measures will be implemented to alleviate or eliminate these adverse impacts, including the widening of some roadways, the construction of new turn lanes and rerouting the planned bikeway. The mitigation measures adopted will be consistent with federal, state and local regulations and will be implemented by the corresponding federal, state and local agencies.

COMMENT LB-5 - Noise Impacts

The potential impacts of the Proposed Project on the noise characteristics of the project area and surrounding environs is discussed in Section 3.2 of the Draft EIS. Airport and aircraft noise, as well as noise generated during construction and that generated by surface traffic, were analyzed for the EIS.

As indicated in the Draft EIS, there are no significant noise impacts due to the proposed project and no mitigation measures are warranted. The State should pursue the abatement and mitigation measures set forth in the Kahului Airport Noise Compatibility Program to reduce existing incompatible land uses within the Airport's environs. With regard to traffic noise, the increase in traffic along Dairy Road will cause a significant increase in ground vehicle noise. Although this impact may be greater without the Proposed Project, consideration should be given to reasonable and feasible mitigation measures. A reasonable and feasible mitigation measure suggested is the construction of a noise barrier along the lots affected by the increased traffic noise. This measure would be implemented if there is consensus among the homeowners and property owners.

COMMENT LB-6 - Air Pollution

Air quality impacts associated with the Proposed Project are discussed in Section 3.7 of the Draft EIS. The impacts on air quality for the alternatives, including the No-Action is presented in Section 4.0. As indicated, continued exceedences of the State Air Quality Standard for carbon monoxide will occur, regardless of the Proposed Project, but will be less than t he impacts of the No-Action alternative. However, all other air quality parameters will be within State and Federal Air Quality Standards.

COMMENT LB-7 - Quality of Life

Quality of life is highly subjective and this concept varies for each individual. The Proposed Project is in keeping with the transportation and tourism goals and objectives of the State and County as outlined in the State Plan and Maui County General Plan. These plans take into consideration the quality of life for the majority of residents and visitors to Hawaii. The social impacts of the Proposed Project is discussed in Section 3.5 and 3.6 of the Draft EIS.

COMMENT LB-8 - Uncontrolled Growth

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5

(Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities.

This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT LB-9 - Segmentation (See attachment "segmentation")

The various improvement projects proposed for Kahului Airport have been categorized as short-term (Phase 1), medium-term

(Phase 2) and long-term (Phase 3). The long-term (Phase 3) projects include the parallel runway, the transient apron, the permanent relocation of helicopter operations, and the fuel supply pipeline from the Harbor to the Airport Bulk Fuel Tanks. As stated in Section 1.5.1, these long-range projects are analyzed in this Draft EIS to determine the individual and cumulative impacts as required by HRS Chapter 343 and NEPA.

However, given that the construction of these projects will occur, if at all, after the Year 2006, and, more likely near or after the Year 2016, the Draft EIS discussed those impacts for these projects which were reasonable and foreseeable. At this point in time, any more detailed analysis would be speculative and prone to error, for it is very likely that each of these long-term projects, and the environs, will undergo substantial changes over the next ten to fifteen years. For example, the scope, size, location and timing of the projects may be altered should air travel to and from Maui evolve and take shape differently than originally anticipated.

If and when the parallel runway, transient apron, helicopter facilities and fuel pipeline are defined in detail and submitted as projects to be implemented, each will be subjected to a more in-depth environmental review as required by state and federal law, *e.g.*, Environmental Assessments, Findings Of No Significant Impacts or Environmental Impact Statements.

The fact that the Draft EIS cannot provide a comprehensive environmental review of the long-term projects does not mean that the Draft EIS is deficient. Under NEPA, multi-stage projects such as this one can be "segmented" so long as the portions of the project that are fully analyzed in the Draft EIS meet the following criteria: (i) they have substantial independent utility; (ii) they do not foreclose the opportunity to consider alternatives to the more speculative, long-term projects that will be studied later; and (iii) they do not irretrievably commit federal funds for those projects.

The short-term (Phase 1) and medium-term (Phase 2) projects proposed for Kahului Airport and analyzed in the Draft EIS meet these three criteria. Each has substantial and independent utility. In fact, even if the Phase 3 projects were never implemented, the Phase 1 and Phase 2 projects would still be necessary and would still serve their intended purposes. The Phase 1 and Phase 2 projects also do not foreclose the opportunity to consider alternatives to the Phase 3 project proposals.

It is anticipated that the design, size, timing, location and need for the parallel runway, transient apron, helicopter facilities and fuel pipeline may change in the next ten to fifteen years. Because the Phase 1 and Phase 2 projects possess their own, self-contained utility, they in no way prevent the consideration of alternatives to the Phase 3 projects.

Lastly, the Phase 1 and Phase 2 projects do not irretrievably commit federal funds for the Phase 3 projects. Indeed, one of the reasons that the Phase 3 projects are speculative is that federal funding for such airport improvements is not and cannot be guaranteed decades into the future. Because the Phase 1 and Phase 2 projects are independent of the Phase 3 projects, funding for the former does not commit funding for the latter.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

760 S. Kihei Rd.
Kihei HI 96753

May 19, 1996

Dear Mr. Wellhausen,

Why, why is there a movement to take away the uniqueness of Maui. We know the lengthening of the runway is a step to the internationalization of Maui airport and possible additional ticks of alien species bringing more destruction of an already fragile ecosystem. You must be aware of the drug problems already present on Maui - do we need to add more?

We support the "No-action alternative" regarding a parallel runway and lengthening of the present runway.

Mr & Mrs W. Boland

See Comment WB-1

See Comment WB-2

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
96.494

August 20, 1997

Mr. and Mrs. W. Boland
760 South Kihei Road
Kihei, Hawaii 96753

Dear Mr. and Mrs. Boland:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 19, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT WB-1 - Internationalization of Kahului Airport

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point, JAL

has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada .re already occurring at Kahului Airport and have been for four .4) years. (See attachment "international flights")

COMMENT NO. WB-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the

Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be

included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1875

David J. Welhouse
Federal Aviation Administration
Box 50244
Honolulu, Hawaii 96850

Dear Mr. Welhouse,

The following is my written testimony regarding the Kahului Airport runway expansion. I AM HIGHLY OPPOSSED TO IT!!! As a person in the medical field I see no way in which we could deal with any type of an emergency situation if needed with the additional air traffic projected. See Comment BBF-2 I am also very concerned about introduction of outside animals, pests etc. I have been where introduced illegally or "drop offs" from international travel have caused severe damage to the land (not just the forest areas) See Comment BBF-1 Infrastructure is a well known noted joke in Maui, I assume you have been around our island and seen the poor excuseses of roadways and their upkeep. See Comment BBF-3 As far as the construction point of view, my husband who is a construction boss said this airport does not help the economy as a few are stating, this is just one job not an ongoing thing! See Comment BBF-4

As folks that were raised on Maui I appreciate you looking at everyones point of view and hope you can see along with your committees that we don't want this. You might want to ask the visitors they say they like the small inter-island flight or West Coast flight it keeps Maui smaller and that's why they come. Consider that the flights from Japan to Kona have taken the ɜat off of this unwanted Maui project. See Comment BBF-5

Sincerely,

Barbara Brandt-Fernandez

cc: Owen Miyamoto
400 Rodgers Blvd #700
Honolulu 96819

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.931

August 20, 1997

Ms. Barbara Brandt-Fernandez
P. O. Box 62
Kula, Hawaii 96790

Dear Ms. Brandt-Fernandez:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT BBF-1 - Emergency Situations

The Hawaii Department of Transportation (HDOT), Airports Division, is aware of the short-comings of the present hospital and health care facilities on Maui. However, regardless of the proposed Project, these short comings will continue until they are corrected. One of the many justifications for alleviating the short comings is an increase demand for better medical and healthcare facilities. While the Proposed Project, in itself, will not cause and increase in demand, it may facilitate that increased demand, resulting in improved medical facilities for the island. This issue is discussed in Section 3.22.5 of the Draft EIS.

COMMENT BBF-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and

Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien

species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT BBF-3 - Effects of Proposed Project on Island Infrastructure

The potential effects of the Proposed Project on Public Facilities, Infrastructure and Services and Aviation Safety are discussed in Section 3.22 of the Draft EIS. As indicated, in general, the proposed project will have no significant adverse effect on the water supply, wastewater collection, treatment, and disposal, telecommunications, police, fire and public safety, and schools of the island. There will be positive effects on the recreational facilities and roadway systems in the vicinity of the airport.

COMMENT BBF-4 - Economic Effects of Proposed Project

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to

the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT BBF-5 - Purpose and Need for Proposed Project

As indicated in the Draft EIS (see Section 2.3) the purposes of the Proposed Project are to (1) create an airport infrastructure wh h will support the present and future goals and objectives of th. county and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the year 2010 in a manner which accommodates existing and forecast aviation demands. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1497

May 15, 1996

Mr. Kaz Hayashida
State of Hawaii-Department of Transportation
Airports Division
400 Rodgers Blvd. #700
Honolulu, HI 96819

Dear Mr. Hayashida,

I an writing to you in support of the Kahului Airport Environmental Impact Statement.

The visitor industry is extremely crucial to Maui. It is the county's main source of revenue. Our visitors spend more than $2 billion annually. In 1995, TAT dollars brought to the state totaled $120 million. Of that total, Maui receives $18 million. These monies are used for infrastructure and support of the impact from our visitors.

53% of Maui County workers are employed in some aspect of the visitor industry. Presently, the job market on Maui is getting tighter with unemployment rates above the statewide average. Clearly, it is important to keep our industry healthy.

Though recent occupancy rates on Maui have been high, we cannot rely on these numbers for the future. There is increased worldwide competition among visitor destinations to increase their number of visitors. Maui also needs to develop new markets with potential visitors. Such markets are those east of the Rockies. The runway extension will allow direct flights from these areas, thus eliminating the temptation to travel to other destinations which have "ease of access" (those destinations with direct flight).

Please support the EIS. It is essential to Maui.

Sincerely,

Nancie Brown
President

Wailea Destination Association

3750 Wailea Alanui
Wailea, Maui, Hawaii 96753-8333
(808) 879-4258 • Toll Free 800-73 ALOHA • FAX (808) 874-5044

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1021

August 20, 1997

Ms. Nancie Brown, President
Wailea Destination Association
3750 Wailea Alanui
Wailea, Hawaii 96753-8333

Dear Ms. Brown:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comments on the Draft EIS for the proposed Kahului Airport Improvements. Your support in your letter of May 15, 1996 for the Proposed Kahului Airport Improvements is appreciated. Your letter and this response will be appended to the Final EIS for review by the decision makers.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

Written testimony on EIS – Kahului Airport

P.J. Bruce, PO Box 3, Paia, Maui HI 96779

May 22 1996

(Copy to O. Miyamoto)

Dear David J. Wellons,

The threat caused by ALIEN SPECIES is NOT IRRELEVANT. Ecological threats of introducing non-native species to our small unique island of Maui are a very serious concern. Visitors come here to enjoy our peace + beauty + get away from urban congestion + noise. At present the vibration and sonic boom cause too much NOISE POLLUTION for most all communities in our Valley: except for Hana + Lahaina, this encroachment in our daily lives is intolerable. Visitors come here to experience a new peaceful more of the same; noise pollution, traffic congestion, loss of native habitat. We want to enjoy our unique ecological system in the 21st c. too. Citizens have shown for years they DO NOT WANT more urban sprawl as in Honolulu. Maui today has less clean air and more polluted vistas. The valley's are not as clearly visible, as they were in the past. Can we focus on healthy issues? Is the human the endangered species on earth? We want a rural environment; with a green valley; not a smoky urban sprawl, not only electrical systems but multilane highways. Dumping, litter, control. If a large airport is to be: IT IS IN the WRONG LOCATION – with not space + next to a vital wet land with endemic birds + wild life. It is time to right a wrong decision of the past. If a large airport is to be, it must logically + safely be located in Puunene – Haiku on the WWII airport site. Spend 200 mil. There, with appropriate inspections + quarantine will the 21st century needs: pristine clean transfer accommodations to world wide transfer of aliens + disease. Maui will not be NO KA OE. or the destination of choice to an unique environment if we destroy it. We need far-sightedness AND SELFLESSNESS on the part of economists. To exclude the National Park Services from discussions + EIS process is undemocratic, unfair + makes the EIS conclusions suspect of bias.

Thankyou Linda. Jean Bruce

See Comment PJB-1

See Comment PJB-2

See Comment PJB-3

See Comment PJB-4

See Comment PJB-5

See Comment PJB-6

See Comment PJB-7

See Comment PJB-8

See Comment PJB-9

See Comment PJB-10

BENJAMIN J. CAYETANO
GOVERNOR

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GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.819

August 20, 1997

P. J. Bruce
P. O. Box 3
Paia, Hawaii 96779

Dear P. J. Bruce:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 22, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT PJB-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding

the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including

information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT PJB-2 - Noise Pollution

The potential impacts of the Proposed Project on the noise characteristics of the project area and surrounding environs is discussed in Section 3.2 of the Draft EIS. Airport and aircraft noise, as well as noise generated during construction and that generated by surface traffic, were analyzed for the EIS.

As indicated in the Draft EIS, there are no significant noise impacts due to the proposed project and no mitigation measures are warranted. The State should pursue the abatement and mitigation measures set forth in the Kahului Airport Noise Compatibility Program to reduce existing incompatible land uses within the Airport's environs. With regard to traffic noise, the increase in traffic along Dairy Road will cause a significant increase in ground vehicle noise. Although this impact may be greater without the Proposed Project, consideration should be given to reasonable and feasible mitigation measures. A reasonable and feasible mitigation measure suggested is the construction of a noise barrier along the lots affected by the increased traffic noise. This measure would be implemented if there is consensus among the homeowners and property owners.

COMMENT PJB-3 - Traffic Congestion

The potential impacts of the Proposed Project on the surface transportation system in the airport environs is discussed in Section 3.22.8 of the Draft EIS. As indicated, the Proposed Project includes changes to the roadway network within and adjacent to the Airport, as well as changes to the Airport facilities themselves, which could affect activity levels at the

Airport. In general, the analyses that were performed using accepted traffic analysis procedures and methods, indicated there will be positive, insignificant, and significant adverse effects on the surface transportation system. However, the Proposed Project in itself, is not expected to result in significant adverse effects on existing key intersections. Several existing intersections will be congested with or without the Proposed Project. That is, the expected natural population growth of the island will result in an increase in traffic regardless of the Proposed Project.

COMMENT PJB-4 - Loss of Native Habitat

The potential impacts of the Proposed Project on the terrestrial ecosystems of Maui are discussed in Section 3.11 of the Draft EIS. As indicated, based on the flora and fauna surveys conducted for the Proposed Project, as well as the expert analyses by our experienced consultants, the Proposed Project will have insignificant effects on the terrestrial flora and fauna of the island.

COMMENT PJB-5 - Urban Sprawl

As indicated in the Draft EIS, the Proposed Project is limited to the immediate airport area and is not expected to directly cause the growth of other parts of the island. The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic

activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui. According to the SIAR, infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more

critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

COMMENT PJB-6 - Potential Effects of Proposed Project on Infrastructure

The potential effects of the Proposed Project on the airport area infrastructure are discussed in detail in Section 3.22 of the Draft EIS. Additionally, a detailed analyses of the infrastructure requirements for Kahului Airport is presented in Appendix L to the Draft EIS. A traffic impact report is presented in Appendix M and P, and an aviation safety analysis is presented in Appendix N.

In general, based on the various analyses performed, the Proposed Project will have positive, insignificant or negligible effects on the water and wastewater systems, telecommunications systems, police, fire and security services, health care services, schools, and recreational facilities of the island. Similarly, for the most part, the proposed roadway improvements will result

in positive effects on the roadway system in the vicinity of the airport. There will be significant traffic effects at some intersections, but these effects will occur with or without the Proposed Project as a result of natural growth of the island.

COMMENT PJB-7 - Wrong Location

The continued improvement of the existing airport would be far less damaging to the environment of the island versus development of a completely new airport at some other location and/or the development of the old World War II airport at Puunene. Development of a new airport at Puunene would result in unacceptable noise, wildlife, and infrastructure impacts on the immediate Puunene area, as well as the rest of the island.

COMMENT PJB-8 - Potential Impact of Proposed Project on Wetlands

The potential effects of the Proposed Project on the wetlands in the vicinity of the Airport, including the Kanaha Pond Wildlife Sanctuary, are discussed in Section 3.12 of the Draft EIS. As indicated, the Proposed Project on these areas will be insignificant.

COMMENT PJB-9 - Inspection and Quarantine Facilities

We agree that current agriculture inspection facilities are lacking at Kahului Airport. One element of the Proposed Project is the design and construction of a new air cargo facility. The HDOT, Airports Division, is committed to the State and Federal Departments of Agriculture, as well as U.S. Customs, being allowed to participate in the planning and design of this building such that they will be able to specify the types of equipment and facilities they require to adequately inspect arriving and departing air cargo, baggage and passengers. This type of facility is expected to facilitate the movement of Maui agricultural products to new and expanded markets, thereby benefitting the entire community.

COMMENT PJB-10 - NPS Participation in Preparation of Draft EIS

We, too, value the NPS's expertise on ecosystem issues and Haleakala National Park. Although the NPS was not formally designated as a cooperating agency for the preparation of this EIS, the FAA and HDOT, Airports Division, provided the NPS with numerous opportunities to provide input during the EIS process. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has

reviewed the Draft EIS. The FAA and HDOT, Airports Division, have used the information provided by the NPS in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1589

Buck Buchanan
416 Allo Street
Lahaina, Maui, HI 96761

May 22, 1996

FAX NO: 1-808-838-8750

Jerry Matsuda, Airports Administrator
Department of Transportation
400 Rogers Boulevard, Ste 700
Honolulu, Hawaii 96819-1880

Subject: Draft Environmental Impact Statement
Kahului Airport Improvements, Kahului, Maui, Hawaii

Dear Mr. Matsuda:

I am against lengthening Runway 2-20 beyond 7,000 feet and I am against construction of Runway 2R-20L. This Environmental Impact Statement (EIS) describes several other projects in addition to the proposed lengthening of Runway 2-20 and the construction of Runway 2R-20L. I could support some of those other projects, but the EIS makes clear that the Proposed Project is an all-or-nothing proposal. Consequently, I am against the Proposed Project.

The Proposed Project contains three development stages: Phase 1, Phase 2 and Phase 3. Each phase contains specified improvements, and together those improvements constitute the Proposed Project.

The Proposed Project may become a reality notwithstanding opposition from me and others. However, the Courts may well rule that this EIS does not meet the requirements of law or of the 1991 Court-ordered Stipulation for the Proposed Project.

I.

The impacts of the internationalization of Kahului Airport are not analyzed or assessed in this EIS. The Proposed Project may not proceed. The extension of Runway 2-20 and the construction of Runway 2R-20L must be eliminated from the Proposed Project. See Comment BB-1

The inadequacy of this EIS regarding international flights is abundantly shown from the following statements in this EIS:

EIS page	Statement
2-22	" ... the Proposed Project will permit the Airport to: (i) better accommodate ... carriers which currently serve destinations outside the state of Hawaii, including ... future international hubs ...."

2-32	"The recommended runway length [9600 feet for Runway 2-20] would accommodate unrestricted overseas passenger aircraft operations to the U.S. Midwest (e.g., Chicago, Dallas and Denver)."
4-20	Table 4-7, Nonstop Air Miles From Kahului Airport Dallas 3,780 statute miles Chicago 4,270 statute miles Tokyo 4,020 statute miles
3-49	"The conclusions for the growth inducing impacts of internationalization, was that there was a potential 'maximal' impact of 11 to 21 percent ..."
Appendix N III-2 to III-6	"An extension of Runway 2-20 to 9,500 or 9,600 feet would permit nonstop service to Chicago, Dallas-Ft. Worth and Japan."
Appendix N III-6	"Forecasts by the State of Hawaii [citation] in Scenario Two project that international flights to Kahului would begin in 2010."
3-48	" ... internationalization of Kahului Airport was not considered as part of the Proposed Project ...."
8-6	"These facilities [interim FIS] could possibly accommodate up to one [international] flight every four hours or two staggered flights per day."
8-6	"The potential impacts of direct international service to Kahului Airport is discussed in this section, to the extent possible. The impacts identified are characterized as 'potential' and 'preliminary' because no permanent FIS facility is planned ...."
8-6	"The environmental impacts of any new FIS facility would need to be addressed in an environmental analysis ... at the time it is planned."

In short, this EIS states that the impacts of international flights to Kahului Airport were not analyzed or assessed because no permanent FIS facility for such flights is a part of the Proposed Project. This position totally disregards the fact that the extension of Runway 2-20 would accommodate international flights from Tokyo and further distances, that interim FIS facilities will be available despite the 1991 Court Order, and that international flights from Tokyo are actually projected by 2010, fourteen years from now.

The purpose of this EIS is not met. The laws and the Court Order are unheeded. The Proposed Project may not proceed. The extension of Runway 2-20 and the construction of Runway 2R-20L may not be considered.

II.

This EIS does not analyze or assess the impacts of alien species as may result from the Proposed Project. The Proposed Project may not proceed. The extension of Runway 2-20 and the construction of Runway 2R-20L must be eliminated from the Proposed Project.

See Comment BB-2

This EIS blandly dismisses the requirement that its purpose is to identify and assess environmental impacts that could result from the implementation of the proposed improvements, as such purpose is acknowledged in item 2.7 on page 2-48. The dismissal of that requirement clearly presents itself in the conclusive remarks on pages 5-12 and 8-12.

"The impact of alien species is a statewide problem and will not be fully resolved in this EIS."

In what appears to be a rationalization for that statement, at page 5-11, this EIS argues that since the State Airport System Plan forecasts increases in passengers and cargo to Maui with or without the Proposed Project, increases in alien species to Maui may also occur. However, this EIS makes the following specific statements which acknowledge alien specie problems directly related to the Proposed Project:

EIS Page	Statement
8-8	"Direct international flights to Maui has led to a concern about the introduction of alien species into Maui's ecosystem."
8-9	"Given that Maui has a more sensitive agricultural environment than Oahu ... it will be necessary to provide Kahului Airport with modern inspection facilities and for the inspection services to operate with effective procedures to enforce stringent standards."

Despite these acknowledgments, this EIS makes no full evaluation of the impact of alien species that could result from the Proposed Project. Further, this EIS offers no analysis of location, design or funding of facilities required to alleviate the impacts of alien species.

The purpose of this EIS is not met. The Proposed Project may not proceed. The extension of Runway 2-20 and the construction of Runway 2R-20L may not be considered.

III.

This EIS does not analyze or assess the impacts of Phase 3 projects such as the construction of Runway 2R-20L. The Proposed Project may not proceed. The Phase 3 projects must be eliminated from the Proposed Project.

See Comment BB-3

The inadequacy of this EIS regarding Phase 3 projects is amply shown. The first boastful claim on page 1-12 is denied by the acknowledgments of failure found on pages 2-48 and 7-2 of the EIS:

EIS page	Statements
1-12	"This EIS analyzes the Proposed Project ...."
1-13	"Those facilities [Phase 3 projects] are considered in this EIS, to the extent possible."
1-13	"To the extent reasonable and feasible, this EIS discusses the potential significant impact for these long-range projects. The potential cumulative long-term impacts of the projects also have been considered."
2-48	" ... the full impacts of [Phase 3 projects] may not be known and therefore cannot be properly assessed at this time."
7-2	" ... the proposed airport improvements are expected to result in very few unavoidable adverse impacts. However, the full impacts of [Phase 3 projects] may not be known and cannot be properly assessed at this time."

As this EIS states in item 2-7 on page 2-48, "The purpose of this EIS is to identify and assess environmental impacts that could result from the implementation of the proposed ... improvements." Obviously, that purpose is not met as this EIS acknowledges on pages 2-48 and 7-2 that Phase 3 impacts "may not be known and cannot be properly assessed at this time."

The purpose of this EIS is not met. The Proposed Project may not proceed. The Phase 3 projects may not be considered.

A full and responsive EIS is necessary prior to commencement of any portion of the Proposed Project. This EIS does not meet the requirements of law or the mandate of the 1991 Court Order.

Respectfully,

Buck Buchanan

Buck Buchanan

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
96.496

August 20, 1997

Mr. Buck Buchanan
416 Alio Street
Lahaina, Hawaii 96761

Dear Mr. Buchanan:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 22, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT BB-1 - Internationalization of Kahului Airport

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point, JAL

has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT BB-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the

Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its a lysis of the potential impact the Proposed Project may have on t.e introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be

included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT NO. BB-3 - Phase 3 Projects

Descriptions, including cost estimates, of the various phases of the Proposed Project are provided in Section 2 of the Draft EIS. The potential environmental impacts of Phase 3 elements are described to the extent possible in Section 3 of the Draft EIS. As indicated throughout the Section 3 of the Draft EIS, the potential environmental impacts of Phase 3 elements that can be identified at this time are discussed, with the note that future environmental impact documentation for those elements will be prepared prior to their construction. Speculation at this time on the potential environmental impacts of preliminarily defined projects would be futile and still need to be supplemented in the future. Rather than speculate about something that is not well defined at present, we have indicated known potential environmental effects and, as stated, will supplement that information in the future. This is in keeping with the letter and intent of the National Environmental Policy Act and the State Environmental Impact Statement laws, rules and regulations. (See attachment "segmentation")

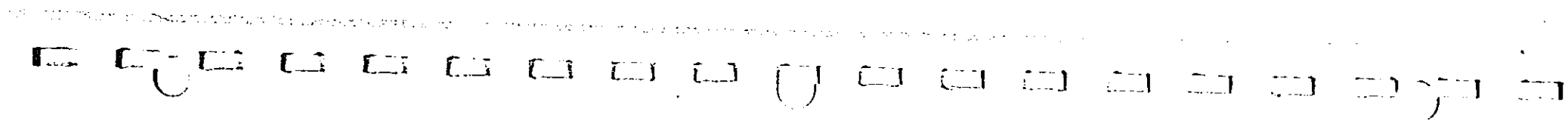
If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)



1284

April 29, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

As a member of the National Parks and Conservation Association and a concerned resident/native of Hawaii, I wanted to voice my concerns over the proposed expansion of the Kahului Airport on Maui:

International arrivals at the Kahului Airport would almost certainly cause catastrophic problems to already endangered species, many of whom are found only on Haleakala. The fertile land sorrounding the Kahului Airport (and extending up to Haleakala National Park) would be an ideal environment, allowing non-native species to gain a foothold. See Comment DAC-1, DAC-2 and DAC-3

With regard to the expansion of the Kahului Airport, the environmental impact statement (EIS) fails to adequately address very important issues.

One such issue is the risk of introducing non-native species. The fact that the FAA has already indicated its belief that airport expansion would pose no threat to endangered species is incredulous! One needs to look no further than Guam to see that this kind of thinking is dangerous. See Comment DAC-3

The EIS also fails to establish inspection and quarantine procedures for the airport. Biological disaster could result if such procedures are not in place. See Comment DAC-4

The FAA and the State of Hawaii Department of Transportation, joint authors of the EIS, have excluded the National Park Service from discussions. As our steward of the land and resources at Haleakala, I find it very alarming that the National Park Service would not be an integral part of this process. See Comment DAC-5

Hopefully, you will carefully weigh my concerns and see that expanding the Kahului Airport will be detrimental to Hawaii's flora and fauna, an essential part of our #1 industry---tourism. Thank you for your consideration.

Sincerely,

Dean A. Calistro

Dean A. Calistro
430 Keoniana St. #209
Honolulu, HI 96815

cc: Owen Miyamoto (DOT, Airports)

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.1022

August 20, 1997

Mr. Dean A. Calistro
430 Keoniana Street #209
Honolulu, Hawaii 96815

Dear Mr. Calistro:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of April 29, 1996 on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT DAC-1 - International Arrivals

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to

terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT DAC-2 - Endangered Species

The potential impact of the Proposed Project on listed and candidate species (endangered and threatened species) is discussed in Sections 3.11.1 and 3.11.2 of the Draft EIS. As indicated in the Draft EIS, there will be no effect on listed or candidate species of plants. Similarly, there will be an insignificant effect on listed or candidate species of wildlife.

COMMENT DAC-3 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the

Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its

analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT DAC-4 - Inspection and Quarantine Facilities

Inspection and quarantine procedures at Kahului Airport are discussed in Section 3.11.3.4 of the Draft EIS. As indicated, the HDOT, Airports Division, is committed to continuing to work with the Hawaii Department of Agriculture (HDOA) and the U.S. Department of Agriculture (USDA) to deter the introduction of alien species through the State airport system. Additionally, HDOT, Airports Division, is committed to incorporating into the new air cargo building to be constructed at Kahului Airport the facilities and equipment recommended by HDOA and USDA that are necessary to deter the introduction of alien species into Maui. This action is one of the mitigation measures developed during the preparation of the Alien Species Biological Assessment.

COMMENT DAC-5 - NPS Participation in Preparation of Draft EIS

We, too, value the NPS's expertise on ecosystem issues and Haleakala National Park. Although the NPS was not formally designated as a cooperating agency for the preparation of this EIS, the FAA and HDOT, Airports Division, provided the NPS with numerous opportunities to provide input during the EIS process. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has reviewed the Draft EIS. The FAA and HDOT, Airports Division, has used the information provided by the NPS in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment

Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

MAY 17 1996

Angie Callahan
Ilima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, Hawaii 96706
May 10, 1996

Mr. David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

I would like to thank you in advance for reading our concerns. I am Angie Callahan and I am a seventh grade science teacher at Ilima Intermediate. As a teacher, I try to teach my students to be contributing members of society. In effort to contribute to their society, they have written to you to express their opinions concerning the airport expansion near Haleakala National Park.

I also believe it is important for students to discover what is important to them, to be able to express these opinions that are important to them, and to stand up for these issues. Because I feel this way, you will find many different opinions, both supporting and disagreeing with the idea of expanding Kahalui Airport in Maui. If I did not think that it was important for children to express their own ideas, then you would be receiving one hundred fifty letters condemning the airport expansion because I strongly disagree with the airport expansion. See Comment AC-1

It has been brought to my attention that the Environmental Impact Statement did not address several key issues, the most important being the introduction of non-native species into Haleakala National Park. Being an intelligent man, you must realize that the introduction of non-native species is certain to happen as the airport gets closer to Haleakala and that it is certain to cause great harm. Please consider this issue very carefully before expanding Kahalui Airport. See Comment AC-2

It was also brought to my attention that a member of the National Park was not included in the writing of the EIS. If this is true, please seek input from the people that would be most knowledgeable about the impact that would be made on Haleakala by the expansion of the airport. See Comment AC-3

I have grown up vacationing in all the National Parks and I cannot imagine my childhood without them. Whenever I need to escape from the every day stresses that life can bring, I think back to the lovely vacations spent enjoying the beauty of the "untouched" National Parks. PLEASE do not take away the opportunity for future generations to escape to the untouched beauty of Haleakala National Park.

Again, thank you for taking time to read my students' letters. If you could respond, it would perhaps encourage them to continue taking an active role in their society thus making it a better place for us all.

Sincerely,

Angie Callahan

Angie Callahan

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
AIR-EN
97.1240

August 20, 1997

Ms. Angie Callahan
Ulima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, Hawaii 96706

Dear Ms. Callahan:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letters of May 10, 1996 on the Draft EIS for the Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT AC-1 - Student involvement

We support your enthusiasm for involving your students in the environmental impact study for the Proposed Project. Unfortunately, in reading your students' letters, they assumed or were led to believe that the airport will be built directly on Haleakala National Park causing rampant destruction of the rainforest. The fact is that the airport expansion will not be constructed on National Park lands nor will there be any rainforest destroyed to build the airport expansion projects. The proposed airport projects will be located at the existing Airport which is twenty (20) miles north of Haleakala National Park. The comments received will be made available to the decision makers prior to the final decision on the Proposed Project.

COMMENT AC-2 - Introduction of Alien Species

Contrary to what you have "heard or read" the Draft EIS did discuss and analyze the impacts of the Proposed Project on the introduction rate of alien species to Maui. The alien species

issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State

regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

MENT AC-3 - NPS Participation in Preparation of Draft EIS

We, too, value the NPS's expertise on ecosystem issues and Haleakala National Park. Although the NPS was not formally designated as a cooperating agency for the preparation of this EIS, the FAA and HDOT, Airports Division, provided the NPS with numerous opportunities to provide input during the EIS process. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has reviewed the Draft EIS. The FAA and HDOT, Airports Division, has used the information provided by the NPS in the preparation of the Draft EIS consistent with their responsibilities as lead agencies.

In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

Jennifer Abellanida
Ilima INTERMEDIATE SCHOOL
91-884 Ft. WEAVER ROAD
EWA BEACH, HI. 96706
MAY 5 1993

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850
808-541-1243

Dear Mr. Wellhouse:

My name is Jennifer S. Abellanida. I'm a 7th grader at Ilima Intermediate. I'm writing this letle because I hear your going to expanding the airport in maui and I strongly disagree with your idea.

Following are a couple of reasons why I disagree: First of all, many non-native species may come into Haleakala. Let the future have a chance to experience it. Hopefully you will understand my words.

If you are going to extent the airport you could tell to get some inspectors, there, so non-native species or bad things cannot come in.

And last but not least, if this was so important why didn't you invite a Haleakala person to discuss this situation. Please listen. Thank you so much Angila.

Sincerely,

Jennifer Abellanida

Jennifer Abellanida

Christina Agapay
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach HI 96706

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir,

Hello my name is Christina Agapay I am 13 years old. And im in the 7th grade. Hi and my classmates read your article about expanding the airport on the island Maui. Me and my friends disagree about it, and think its bad because there are endangered species in Hale'akala. If you guys expand the airport on Maui. it would kill the endangered animals and other living things. How would you feel if you were an endangered animal and people were planning to expand an airport where your home was and the people chase you out of your home? Think about the endangered species not the money. You can always make money but not make another endangered animal.

Jermaine Alcantara
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706

David J. Wellhouse
Federal Avation Administration
Airports District Office
Box 50244
Honolulu, HI 96855

Dear Sir:

Hi, my name is Jermaine Alcantara, and I am a 7th grader at the school of Ilima. I am writting to you because I disagree with the (EIS)'s decision of expanding the airport that they have on Maui. What is the use of expanding the airport if already 1.6 million people visit the island of Maui. Expanding the airport is like inviting people and other things to come here and destroying the island, and it will just make it a higher percentage of bringing a non-native animal to the island and destroying the native animals. And if they do expand the airport thy will have to be more strict on what people are bringing to the island.

Sincerely,

Jermaine Alcantara

Jermaine Alcantara

Arlene Alejandro
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach Hi, 96706
May 9,1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu Hi, 96850

Dearest Sir:

Hello there! So how are you today. Well before I go on I should introduce myself to you. My name is Arlene Alejandro. I am a 13 year old girl that goes to Ilima Intermediate. I love Baby animals very much. I like to play with them whenever I have a chance to. Oh, I'm in the seventh grade. So you sent out a Flyer asking people to write to you. so that is why i'm writing to you right now. I think you should things the way it is now. Who would want to have a big airport. The bigger the more time you would waist from getting to one place of the airport to another.. So that's one reason on not to make the airport bigger.

Look at the damages it might cause. There will be too much way too much visitors. Who would want people from other countries, who doesn't speak english crown up in the place you used to always hang out at the mall or anywhere wouldn't you be mad? I sure would. Who needs more people on Hawaii anyways. Another reason would be if aliens or other unnatural things grow and live in Hawaii it might cause great damage. It could eat other things. And it also could take over Haleakala.

One reason you might want to hear about is this: What if you lived near by the airport and there would be a lot of dust and things in the air which could pollute the air, could bring up a lor of cleaning at your home. One day you would have to sweep and you cleaned it all up and nice, you put a lot of work into doing that. Later the next day it would be dirty again and you would have to clean it all up again. Well think about those reasons. Now you probably will not make any changes after reading our letters from Ilima Intermediate School. It's been fun typing to you but I'm running out of words now so that is all i'm going to put so Bye-Bye for now.

Sincerely,
Arlene alejandro
Arlene Alejandro

Grace Alegre
Iliima intermidate school
91-884 Ft. weaver Road
Ewa Beach Hi, 96706
May 6,96

David J. Wellhouse
Federal aviation administration
Airports District office
Box 50244
honolulu Hi, 96850

DEER SIR,

hi my name is Grace Alegre concerning about the Haleakala National Park and the expansion of the airport. I think you shouldn't buil a airport out of the national Park because when your tourists come to visit they could see the beautiful Haleakala National Park. Can't you go some where to buil it the airport. The people of Maui will be thankful as you read this letter I hope this letter (and others) will change your mind so do it for your people.

Good luck

Sincerely,
~~Grace Ragasa Alegre~~
GRACE Ragasa Alegre

Ginger Amaral
Iliima Intermediate School
91-884 Ft weaver road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu HI 96850

Dir sir!

Hi my name is Ginger Amaral. I go to Iliima intermediate school I am 12 years old and is in the 7th grade. I am writing this letter because I heard that you are thinking of Expanding the airport being expanded nearby Haleakala.

I feel that the airport should not be extended. the reason why I feel that is because there are alot of endangered species there. If you expand the airport alot of the animals will die. There are alot of rare animals and plants that people would want to see and if you build your airport near them there will be nothing

I also feel that you should not expand the airport because Haleakala is a national park so please do not expand the airport. Remember these animals belong to hawaii. I just like to say save the species. Mahalo

Sincerly,
Ginger Conrad

Ginger Conrad

Lauren Aoki
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi! My name is Lauren Aoki. I am writing this letter to stop the extension of the airport on Maui. I think that this is the biggest mistake that you can ever make.

For one thing, Haleakala holds more endangered species than any other site in the National Park System. By expanding the Kahului Airport, there is a risk of introducing non-native species to the island. Then, who knows what animals will be left for the 1.6 million visitors a year to see?

Also, it will be a threat to endangered species if the airport is only 15 miles from the park. If an unknown animal gets loose, it has only 15 miles to travel before possibly wiping out all the endangered species.

It is important to have inspection and quarantine procedures at the airports. It will help in keeping unwanted animals and other unwanted things off the island. Without it how will we know what kinds of poisonous animals we might have on the island of Maui?

How can EIS make Haleakala a better place without any discussions? It is totally impossible. They need to talk and try to make Haleakala better. I think it is extremely unfair by excluding this.

-- Haleakala is a gold mine. Its 29,000 acres of land holds many endangered species that can be gone forever. Now, would you want that to happen to the best preserved piece of tropical rainforest in the National Park System?

Sincerely,

Lauren Aoki

Lauren Aoki

Jarel Apostadiro
Kimi Intermediate
91-884 Ft. Weaver Rd.
Ewa Beach Hi, 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, Hi 96850

Dear Sir:

Hi I'm Jarel Jane Apostadiro and I go to the Kimi Intermediate School. I'm writting to you about the airport expansion. I think you should not expand the airport. You should not expand the airport because there would be no room for anymore animals and if they expand they airport it would be closer to the animals. The animals might die or get sick from the gas and all the other poisonous things that go around the airport that could affect the lives around the animals. They should expand the park and not the airport so we could have more animals or species come to Haleakala

ADRIAN GALISACAN
Ilima Intermediate school
91-884 Ft. weaver rd
EWA Beach HI 96706
May 7, 1996

David J. wellhouse
federal aviation administration
Airport districts office
Box 50244
Honolulu, HI 96850

Dear Mr. david J. wellhouse

Hi my name is Adrian Galisacan's from Ilima Intermediate. I am writing this letter because I dont agree with the airport expansion on Maui because if you cut down all the trees and all that is there where are the animals is going to live?

I disagree because if you cut down the forest all the animals that live at the park are going to die Why do you want to make anew airport?

Sincerely,
David John Apostadiro
DAVID JOHN APOSTADIRO

I disagree because you are going to pollute all the air from all the planes. Also in maui there is another airport and theds how you are going to pollute there air.

Sincerely

Adrian Balisacan

ADRIAN BALISACAN

yardley R. Batalera jr.
Elima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hello, My name is yardley and I dont thinks it's a good idea to Expand the kahului airport it could lead to bad News at Haleakalā National Park. The Airport is 15 Miles away and if you expand the Airport it becomes closer to the pa. The plane's distribute pollution and it has a better chance of killing trees, because of the.

I was born in kahului, Maui and I fly to Mau every summer to see my Mom and when I Arri or Depart from the Airport there seems to be No Problem with it. So why do you want to expand it.

I dont think you should Expand the Airport it's Fine. I like Animals especially bird's if you expand the Airport it pul's the park at Risk. Mrs. Callahan told us about the snake's On the Planes and if a snake arrive in Hawaii it has a good chance of Making it to Haleakala National park and if they do they could eat bird's and Maybe if it's dangerous it could bite someone and if it's poisonous it could be deadly.

Sincerely:

Yardley R. Batalona

Yardley R. Batalona jr.

Rhea-Cherie Batangan
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706

May 6, 1996

David J. Wellhouse
Federal aviation administration
airport District Office
Box 50244
Honolulu, HI 96850

Dear Sir,

Hi, my name is Rhea-Cherie Batangan and I'm a 7th grader at Ilima Intermediate School on Oahu. even though I don't live on Maui, I'm very concerned about the airport expansion. If they were to extend the airport, then what would happen to all the trees and wild life? Expanding the airport would be like inviting more brown tree snakes and other dangerous animals on to the island. Does the airport even have metal detectors and other ways of checking luggage? It would be very easy for someone to bring a weapon, dangerous animal drugs, etc. The pollution and violence we already have in Hawaii is bad enough. What's happening to our so-called "Paridise"? Some people don't care and are only in it for the money, not for Maui's happiness. So

I am going against the FAA, I don't think they should expand the airport.

Sincerely,

Rhea-Cheric Batangan
Rhea-Cheric Batangan

Carlos Bautista Jr.
Iliima Intermediate
91-884 Ft. Weaver Road
Ewa Beach, Hi. 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, 96850

Hi my name is Carlos Bautista Jr. I'm only 12 years old. I'm going to make thirteen on June 1st next month. I'm in the 7th grade at the Iliima intermediate.

I just wanted to know why you're building a building on top the best tropical Rain forest in the National Park system. Plus if you build over it you might have to kill some animals. Man, I don't know why you would have a building instead of a Rainforest. Nature is better than a city. If the people that fly in bring animals to Maui might get loose and go to the rainforest. Plus if it's illegal it might be ferious.

Well if you don't want to change nothing well thank you for reading this letter. Insted of throwing it away. Some people just don't want kids doing adult stuff.

Lee Andrew Bohne
Ilima Intermediate school
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, HI 96850

Dear Sir :

My name is Lee Andrew Bohne. I am 13 years old, and I strongly think building a bigger airport is wrong, because you can bring alot of animals from the main land to Hawaii, and the animal might dangerous. They might kill people like tourest.

I don't only think about that reason but also will kill other animals

sinceraly

Lee Bohne
Lee Bohne

JARVAS CABALLES
ILIMA INTERMEDIATE SCHOOL
91-884 FORT WEAVER ROAD
EWA BEACH, HI, 96706
MAY, 6, 1996

DAVID J. WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIR PORTS DISTRICT OFFICE
BOX 50244
HONOLULU, HI, 96850

DEAR SIR:

HI, HOW IS IT UP THERE, IM A STUDENT AT ILIMA INTERMEDIATE AT EWA BEACH. HOW COME you guys WANT TO EXPAND THE AIR PORT IN TO HALEAKALA, WHY DON'T you EXPAND IT THE OTHER WAY, INSTEAD OF MAKING IT IN TO HALEAKALA, ANY WAY WHAT'S THE WHOLE POINT OF EXPANDING THE AIR PORT.

SINCERELY,

Jarvas Caballes
JARVAS CABALLES

Jackie Carriaga
Ilima Inter. School
91884 Ft. Weaver Road.
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244.
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hello! My name is Jackie Carriaga. I attend Ilima Intermediate School and is in the seventh grade. I am writing this letter because I want to tell you some of my opinions about the airport expansion in Maui and I care about our Hawaiian Islands.

Some of my opinions are about the non-native species, airport inspections, and about if you should or should not include a member from Haleakala. First of all, I don't really agree about the airport expansion because if you do, there will be non native species that would invade our islands and the parks.

If you heard about the brown tree snake in Guam, it could hurt a lot of people and insects or animals, and also plants. If a snake like the brown tree snake or any other non native species was in our area I wouldn't be able to go out of my house because I would be too scared.

also, about the airport inspections, yes, I would think and I do think Maui airport and all airports should have inspections because someone could carry a weapon or drug and could do something bad on or off the plane or in the airport. Some things you could have to do the inspections are trained dogs or computerized things that could search your clothes and luggages.

Lastly, I would include a member or several members to help out and give their own opinions about the airport expansion.

Thank you very much for reading this letter and for your time. I hope things will work out.

Sincerely,

Jackie Cadiaga

Leslie-Rose Carlos
ILIMA Intermediate School
41-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear Sir,

I am a 7th grader at ILIMA Intermediate school. I am writing to you because I do not support the idea of the airport expansion on Maui. I do not support this idea because it will hurt Hawaii's native animals and plants in many harsh ways.

I do not like the idea of alien species "accidentally" being brought in by the ~~air~~ airport expansion. The airport expansion will be so close to the Haleakala National Park if it is built. And because it is going to be so close to the park I am worried that these "accidentally" dropped alien species will wipe out our native species. We need to preserve our native species. The native species are important to us.

Sincerely,

Leslie-Rose Carlos

Daniel Chong
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach HI, 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI. 96850

Dear Sir:

Hello my name is Daniel Chong. I'm a student from Ilima Intermediate. I think you are being inconsiderate for the endangered spieces of Hawaii because you just want to make the airport longer into the park. Also, why do you want to expand the airport? Is it for money or tourists? If you destroy Haleakala National park we will never know if there is a plant that can cure cancer. I think you should also tell the EIS committee to add a provision for a check & inspection.

If you don't inspect any people they could just bring in drugs and illegal weapons. You should make the inspection more strict. So my opinion is that you should include in the EIS to continue inspections and if you really want to expand the airport you should expand it the opposite way of Hakakala National Park.

Yours TRULY,
Daniel Chong
DANIEL CHONG

Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, Hi. 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi. 96850
808-541-1243

Dear Sir:

My name is Jessica Clay. I am twelve years old. I am writing this letter because I disagree with your opinion on expanding the Maui Airport. I feel that expanding the airport would affect the Haleakala National Park. I think that it would affect the park in these ways 1.) The animals in the park might die from the airports pollution 2.) When the airplanes come in they might be carrying dangerous plants or animals, that could get loose and kill the plants and animals already there 3.) and finally, you haven't even talked to the National Park Service about this. I would suggest that you not expand the Maui Airport, for these reasons. If you still feel that you should expand the airport, then please write me back and tell me this reason.

Sincerely,
Jessica R. Clay
Jessica R. Clay

Ann Clary
Ilima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, Hawaii 96707
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850
(808)-541-1243

Dear Sir:

Hello my name is Ann Marie Clary. I'm twelve years old, and in the seventh grade. Some day I hope to become a veterinarian. I strongly disagree with the idea of expanding the Kahalui airport.

You see, one day I hope to be able to cure for feline aids, and like other rainforests and national parks I believe Haleakala National Park may hold one of the necessary items for a cure.

I understand you have no where else to expand towards the mountains, but I believe to solve your problems you should rely on other means of transportation. If you believe expanding the airport will pose no threat to the park then you're fooling no one but yourself.

It has been brought to my attention that when you held the hearings for this issue no one from National Parks and Conservation-Association or other people that strongly believe in the sake of the park were there, I'd like to know why.

Hawaii has one of the worlds most important national parks because of it's population of endangered birds and plants. Have you ever considered that planes in the park would inhance the problem of non-native species and maybe even snakes? Hawaii is the only snake and rabie free state in the U.S. If you continue on your quest Hawaii could be the next Guam. I've seen the impact snakes can have on birds from the two years I lived in Guam.

Failing to inspect and quarentine only shows your lack of respect for Hawaii's natural resources. Even if you did just remember a ions speak louder than words. I think it is also possible for t National Parks and Conservation Association to sue you if they bring up charges such as ...
1) Failing of inspection
2) Excluding the Natoinal Park Services from discussions
3) The by-passing of quarentine.

This parks future lies in your hands and I hope you have the guts to stand up for what's right and not for money. Right now money is buying you the a job and parks people the right to put you out of business.

I honestly hope you think twice before you cause any pain and trouble. The future is not something to be taken lightly.

Sincerely,

Ann M. Clary

Kani Colipano
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hello, my name is Kani Colipano, and I am a 7th grader at Ilima Intermediate School. The reason why I'am writting to you is about the expansion of the Kahului Airport I do not support your idea.

The reason is the risk of having non-native species brought into Hawaii It would be very easy without any inspection or quarintine procedures. I am sure you wouldn't want to turn Hawaii into another Guam. This is a serious mattir and I hope you will recorsider.

Sincerely,

Kani Colipano

Kani Colipano

Devinn Couch
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports ~~Department~~ District Office
Box 50244
Honolulu, HI, 96850

Dear Mr. Wellhouse:

My name is Devinn Couch. I am a 7th grader at Ilima Intermediate School. I disagree with your choise to expand your airport. I think Kahului Airport is big enough already. It brings in over 1.6 million tourists a year.

You should be thinking about more than just money. You should be thinking about all the poor animals that you might hurt or even kill. They have family too. If you expand the ~~airport~~ airport and you kill the last of one type of animals, it will be your own fault. all the people will miss out on the wonder of that animal.

If you do build the airport too close to Haleakala National Park, you might bring snakes and other animals in that can be harmful to animals and plants that they eat. If you were ~~and~~ an animal and ~~cut~~ people cut trees down and your home was in one of them, how would you feel? Wouldn't you be sad and upset? Please don't build the airport out more. Please respond to my letter.

Sincerely,

Devinn Couch

Devinn Couch

Dustin Crouch
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI. 96706
MAY. 7, 1996

DAVID J. WELLHOUSE
FEDERAL Aviation Administration
Airports District Office
Box 50244
Honolulu, HI. 96706

DEAR MR. WELLHOUSE,

Hi, my name is Dustin Crouch. The reason I'm writing this Letter to you is because I'm concerned about the expansion of the Haleakala airport. I do not think this is a good idea.

my opinion, is that if you expand the airport it would damage many plants and surrounding wildlife. It would also bring many non native species of animals not currenty allowed in HAWAII. I do not want HAWAII to become another Guam.

Also, I do not think anyone wants more ~~than~~ sources of pollution on the island. I think the expanding of the airport would cause more pollution. Removing wildlife and plants and causing some to die is not worth a bigger airport. We need to utilize what we have better instead of making it bigger. Bigger is not always better.

Sincerely,

Dustin Crouch

Dustin Crouch

Gilbert Cruz
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, Hi 96706
May 7, 1996

David J. Wellhouse
Federal Ariation Administration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Mr. Wellhouse

My name is Gilbert Cruz, I'm in 7th grade in Ilima Intermediate School. I am writing this letter because I do not agree to make this Airport because it probably cause pollution. And it will cut the trees, kill the plants, the birds, and some of the animals will not go there because there is no more plants and trees to go with or a place to live.

If you make the Airport bigger, you will kill the plants and the animals will run away form this place. And always remember Mr. Wellhouse, plants and animals are important on our environment.

Mr. Wellhouse, I think a small Airport is enough because there are three airports, even two big and ones. The small one might be enough for all the plains in Maui. Maui will get traffic in the sky if you keep making Airports. You don't have to make it big because there is enough available space to fit the airport. Don't try to change the National Park to make the Airport bigger.

Sincerely,

Gilbert Cruz

Christina Drawdy
Ilima Intermediate School
91-884Ft.Weaver Road
Ewa Beach, Hi 96706
May 6,1996

David J.Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Sir:

My Name is Christina M. Drawdy, I am a seventh grader at Ilima Intermediate.I am writing this letter because I wanted to let you know that I feel very strongly about saving the rainforest.

First of all, I want to talk to you about what would happen if you do open an airport.If non-native speciesare on the plane and arrive in Hawaii it would be very dangerous. If you recall the alien species ,brown snakes,took over Guam.Don't you think it would be scary to have to worry about a snake eating your baby in the night? I sure know I woudn't be able to sleep.

If it was decided to open the airport and you didn't check the luggage after every flight then I'm sure that many non-native species would arrive there. Just Think, how would you feel if you did open the airport and some deadly,alien-species came to Hawaii and killed hundreds of people. Don't you think you would feel kid of responsible for all those deaths?

Sincerely,
Christina Drawdy

Ilima Intermediate School
91-884 FT. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear Sir:

HI!!! My name is Vincent Marvin A. Aulatre and I am in 7th grade at Ilima Intermediate School. I don't think it's a good idea to extend the Airports, because it will affect the environment of the birds, and animals and especially the plants and trees that are in the area. Instead why not make the airports a little bit looks nicer by painting whole building new claire

Sincerely,
Vincent Marvin A. Aulatre
sign name
VINCENT MARVIN A. AULATRE
print name

Theresa Edrosolan
Ilima Intermediate School
91-884 FT. Weaver Road
Ewa Beach HI. 96706
May 6,1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu ,HI 96850
808-541-1243

Dear Sir:
Hi, myname is Theresa EDrosolan. I am in the 7th grade at Ilima Intermediate School.I writing to you because I am concerned about Haleakala National Park. I Don't want you to expand the airport because we could damage the land.

Haaleakala is a very nice place.If you build over the land then there will NOT be enough fresh air because you will need to cut down the tree.If you expand the airport which you need plains.You will pollute the air.Then a lot of people will get sick.You will have to take some of the animals away.You will destroy the land..If you expand the airport, you will bring tourist to the island, I know it brings money,BUT more people, more car which also pollute the air.It will leave a hole in the earth.

If you expand the airport then you will need a search for animals because the animals that some people bring in could be sick and could kill the animals or even people on the island.If you do decide to expand the airport and don't have a search for animals, some animals could get sick and even die also people too.Some animals in the park could be scared because the tourist who comes.Anthor reason is that some people could have guns and could go to the park and kill the animals.These reasons are why you should search for animals and guns.

I think you should include the residents of Haleakala because they might have something very important to say that could change you'r mind.What if I held a meeting and did not include you.You would be very angry.

WELL HOPE THIS CHANGES YOU"R MIND

Sincerely,

Theresa Edrosolan

P.S. Thank you for reading this letter
THINK ABOUT IT

Ary Epan
Olina Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706

Dear Sir,

My name is Ary Epan. I'm 13 years old and I'm a 7th grader at Olina Intermediate. I'm writing not just because this is an assignment, but because I don't want you to expand the airport at Maui. The Haleakala National Park on Maui is a very important park. It's important to the endangered species and to us who would someday like to see the park and species we've never seen before, or never known existed. Even though the forest is small, it is probably the best preserved piece of land in the National Park System. It is also known that it holds more endangered species in any other site.

Alot of unwanted alien species come on the island through the

Honolulu Airport. If their arrival is not controlled, then we can just say goodbye to these endangered species. The Hawaiian Islands are important in both of ways. One of them is important because of the rainforest on Maui. If you expand the airport on Maui that's only a scant 15 miles away, then you would be taking away something important that belongs to the islands. No one can guarantee that even if you don't build the airport that exotic species ~~will~~ won't come. But if you do expand, there will be a greater chance of a biological catastrophe to be greater. Is it worth it to lose endangered species forever for an expansion of an airport.

Sincerely,

Ivy Epan

IVY EPAN

Mark Eslit
Ilima Intermediate school
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhausen
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir,

I'm 12 year old, am in the seventh grade, and go to Ilima Interme school. I am writing this letter to tell you about my opinion on expanding the Kahului airport.

I disagree with expanding the airport because, I feel, if you do the you might be putting the Endangered plants and animals of Haleakala Nation Park more into extinction because you would be destoying the habitat. I also think that it is bad because the F.A.A. didn't establish inspection and quarantine procedures for the airport. At least with there, it would be allright to expand the airport because at least y would be trying to see if the plants and animals that people bring a alien species or not.

I would like to have a response on why you need to Expand

the airport. I want to know this because the expantion might get to close to Haleakala National Park and if there air alien species abord the planes it might kill off the species of the park.

Sincerely,

Mark Eslit

Mark Eslit

Jon Robert Evans Jr.
Robert EvanIlima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, H.I. 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
BOX 50244
Honolulu, H.I. 96850

Dear Mr. Wellhouse:

My name is Jon Robert Evans and I am in the seventh grade. I am 13 years old. I am writing because I disagree with the expanding of the airport in Maui.

I believe that expanding the airport is like a deathtrap for Hawaii's beautiful animals. It also takes up space. Space that can be used to help Hawaii instead of distroying it.

If inspection and quarantine are not enforced, many animals from different countries will enter Hawaii and wipeout everything. So I think the airport should be expanded unless it is relay necessary or like some people say... "A Life Or Death Situation."

Sincerely

Jon Robert Evans Jr.

Jon Robert Evans Jr.

Stephen Fernandez
Ilima Intermidate school
91994 Ft. Weaver road
Ewa Beach Hawaii 96706
MAY 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, Hawaii

Dear Sir:

I'm Stephen Fernandez of Ewa Beach. I strongly write ~~you~~ about not to expaned the Airport in Maui because it will distroy the rainforest ~~and~~ and there might be a cure in the rain forest but we will never know unless you don't expan the airport.

Also some of the ~~of~~ planes are bring non-human over the trips like Brown tree snakes and they go in the forest and produce more snakes & will make the people don't want to go to maui because they would have ~~the~~ a hard time sleeping.

It would also be bad for the boisness because their would not be any reason why to expanned the airport, speacily the ~~people~~ toorist hikers because they love the rain forest so much.

91-824 Ft. weaver Rd
Ewa Beach, HI 96706
May 7, 1996

david J well house
Federal aviation administrations
Airports District office
Box 50244
Honolulu, HI 96850
FAX - 541-1243

Dear mr. david J. well house

Hi my name is Raymundo and im in 7 grade from in the intermediate. Im writing this letter because I don't agree because all the animal are very danderous.

I agree becouse I wan the animal in the zoo and I wan to about the constant I wan the air port bigir so they going to have more air plane and more space.

I disagree because your going to pollute all the air from all the planes and also there is another airport in Maui and also they going to pollute all the air

Sincerely,

Raymundo Galiza

Raymundo Galiza

Jennifer Gallegos
Iliima Intermediate
91-8864 Ft. Weaver Road
Ewa Beach, HI 96706
May 6 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Jennifer Gallegos and I'm in the 7th grade at Iliima Intermediate school. My classmates and I have read the alert paper which was about expanding the Maui airport.

I really feel that you shouldn't expand the airport on the Haleakala National Park. There are a lot of endangered species and also plants and we don't want to loose them.

You shouldn't just think about making money but you should also think about how the animals would feel if you expand the airport on their home (the Haleakala National Park.)

I hope you understand how I feel about building or expanding a larger airport on the Haleakala National Park.

Sincerely,

Jennifer Gallegos

Jennifer Gallegos

Ilima intermediate School
91-884 Ft weaver Road
Ewa beach HI 96706
MAY 6 1996

David J wellhouse
federal aviation administration
Airport district office
BOX 50244
HONOLULU, HI 96850

Dear Sir,

My NAME is Rolando Gangcuangco and I AM in a 7th grade I AM against what your doing because I think that it will look ugly and hurt the animals. If the animals are not there what will you do when you the person responsible for the extinction of the animals.

BUT I think THAT you should EXPAND the Airport because you probably get more money because more people are going go to that Airport and I think that it will have more room in the airport and thats. all I have to SAY.

Sincerly:

Rolando Gangcuangco
"Rolando Gangcuangco"

Geena Garcia
Ilima Intermediate School
91-836 Ft. Weaver Road
Ewa Beach, Hi 96706
May 6, 1996

David J. Mellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, Hi 96850

Dear Sir

Hello! My name is Geena Garcia. I am attending Ilima Intermediate School, located at Ewa Beach, Oahu. I am in the 7th grade. I feel strongly about the environment because it's the reason we live. Without plants we can not breath oxygen. I

my childeen's childeen to be able to live freely and breath oxygen like us.

I have read the National Park and conservation association papers. I saw that you are planning to expand the airport on Maui. There are nothing wrong with expanding an airport but did you know that Haleakala Park. a few miles away from the airport. Human animals may come from in-coming planes, and we don't want any unwanted animal coming and destroying the Haleakala Park. Haleakala park is to be enjoyed not to be endangered of non-human animals. Haleakala is a tourist attraction and we need to have the best security possible. Non-human animals will and would eat our animals and plants if non-human come, they could destroy alot

of things and people would
get hurt

I wanted ~~to~~ you to put this
in mind and to your attention.
Thank you for taking your time
to read this letter. Hopefully
my ideas are being thought
out carefully. With love and
respect.

Sincerely

Maria

Garcia

Mark Romero
Kima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 9, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50344
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hi! Hello. How are you? My name is Mark Romero and I'm in 7th grade in Kima Intermediate School. I don't support the idea that the airport should be extended because it is close to the Haleakala National Park and a lot of animals there are endangered.

I assumed that the idea of extending the airport to you is bad and if you think its not bad thats your opinion. If you extend the airport I

might not be able to see the animals in the future if I visit Haleakala National Park.

I want tourists people who come to our island to see the beauty of Hawaii and to see different places especially Haleakala National Park. I don't want places decreasing in Hawaii. I hope a lot of people who wrote to you didn't want the airport to be extended. The airport that is already in Maui is just fine.

Sincerely,
Mark Gomez
Mark Gomez

Ilima Intermediate
91-884 Ft. Weaver Road
Ewa Beach Hawaii 96706
May 6 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu HI 96850
808-541-1243

Dear Sir:

My name is Allison Goodman. I attend Ilima Intermediate. I am twelve yrs. old and in the seventh grade. My teacher, Mrs. Callahan, received a letter saying that the Maui Airport is going to expand into Haleakala Rainforest. I am writing to tell you I strongly disagree with this idea.

The airport is not a good idea. Our ozone layer is already in danger. Why get rid of all that fresh native wild life? Would you rather have a airport for nobody because we'll all die out because you had to cut down our trees just to expand the airport, or you could have the airport you already have and that your better of with? Your pick. Also, it is a very bad idea for another reason. I understand you don't have a check to make sure that no illegal foreign stuff is transporting in and out of the state. A lot of foreign air good be brought in the air into Haleakla if the airport is too close. Hawaii could be turned into the next Guam in just a couple of days!!!! Think of all the dieseses and poison you would bring (Not to mention that Hawaii is a rabbi-free state).

Years to come I would like to bring my own family to these beautiful Islands. I'll always remember that we'll have you guys to thank because you took us kids seriously. Now, lets make that a real dream come true. Read and respond to my letter as soon as possible.

Sincerely,
Allison Goodman
Allison Goodman

Jenera Griffith
1 Lima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850
808-541-1243

Dear Mr. Wellhouse,

Hi, my name is Jenera Griffith. I am in the 7th grade and I'm 12 years old. I'm writing because I heard about how you are trying to make the airport ~~bigger~~ on Maui bigger. I don't agree with you. Because you will bring more non-native species to Maui and they will cause harm to the endangerd species.

It will kill the animals because the air plane can pollute the forest where the animals live. And when other outer island animals come here they can get ~~away~~ away and kill or hurt the animals. Also all the noise that the plains make can scare the animals

I don't get it when you say you want to make the airport bigger. When you new it is by the endangerd species national park. Because you already get alot of people that fly down there to see the island and the endangerd species park. So if you expand ~~the~~ the airport and some of the animals die than it will decress the population of people that come and see the endanger species park. They might come down to see the island. But not the endangerd species park. So please take our advice and dont expand the airport. Thank you for your time so you can read this letter and many more letters to come. So if you have time to write back to us please do so.

Sincerly,
Jenera Griffith
Jenera Griffith

Ilima Intermediate
91-884 Ft. Weaver Road
Ewa Beach HI. 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Amber Grzegorczyk. I am writing you to tell you I am totally against your act to destroy Haleakala to extend the airport. I would also like a fast response on why you are extending the airport.

If you are wondering why I am against your plan then here are my explanations to why. You for sure harm all kinds of species plant and animal. These species are not just any ordinary species they are endangered species! If you know what endangered species are then you should know that it is very important to let this place stay exactly where it is.

Another reason I am against this plan is because it will cause a great deal of pollution. If there is a lot of pollution then people will not be coming to Maui.

So you will not need an airport except for those people who are leaving. The pollution will probably hurt them before they leave.

So please look over the following topics and give me a quick response to all my questions and comments. And please remember this is my future and your children's future too.

Sincerely,

Amber Grzegorczyk
Amber Grzegorczyk

Aurie-Justina Halmos
Iliima Intermediate School
91-984 F. Weaver Rd.
Ewa Beach, HI 96706

May 7, 96

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello my name is Aurie-Justina Halmos. I'm from Iliima Intce. School in Ewa beach on the island Ohau. I'm a 13 year old girl in the 7th gr. I'm writing to you because it has come to my attention about the Airport being expanted into Haleakala.

Well first thing is I feel that the Airport should not be expanted into Haleakala. But along side of that I also have a question | questions that I would like to ask, and hopefully you will answer. I would like to know why the Airport District office wants to expant the Airport? And when are they planning to expant the Airport if they ever decide?

I just don't understand why you have to expant the airport when its doing fine as it is now. Haleakala is also ~~and~~ important as well as the airport. Haleakala is important for its old native plants and animals, their trying to do something that most people cant do. which would be saving ~~[illegible]~~ one of the worlds last important things.

I think you/we should keep everything the way it is and keep the peace. I hope that you understand what I'm trying to say. I also hope that you will have a heart and chance to repound to my questions and make me understand more. I would also like to know how you see it from your point of view.

Jacqueline Hashimoto
Iliima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Honolulu HI 96850

Dear Sir;

Hi. My name is Jacqueline Hashimoto. I am twelve years old soon to be thirteen. I lived in Hawaii all my life, and it has come to my concern that the Federal Aviation Administration, and the Department of Transportation Airports wants to extend the Maui airport into Haleakala. I feel very strongly about the enviorement and I disagree with the idea of extending the airport into Haleakala. I have never been up to Haleakala before and I hope that someday I can go up there with my family. If you distroy it I will never be able to see how beautiful Haleakala really is. I also feel that you should check the luggage of the tourist coming into Maui and all of the other Hawaiian Islands. Because we are not doing this all of our native plants and animals are being killed. Is there a possible way of extending the airport a different direction? Is there any way to set up a luggage scan while getting off board? These are the two questions I have to ask. I look forward to recieving a response.

Sincerely,
Jacqueline M. Hashimoto
Jacqueline M. Hashimoto

matthew Hernandez
Ellima Intermediate School
91884 Ft Weaver Road
Ewa Beach HI 96706
May 6 1996

David J Wellhouse
Federal Aviation Adminstration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Sir

My name is Matthew Hernandez. Im writing about the land. If you take the land it will be like Honolulu. What happens if people bring a snake? We will be the next Guam. And some other Alien animals will be transported here illegally. Some of our land will be all gone. What about the beutiful land some of our native birds will be all extinct. And the Airport is big enough for tourist too come.

What happens if there was a disease a plant that can cure some of the diseases. and you destroy them.

you should make your airport some place else on the island. What happens if one of those monkey's come with an unknowable disease? Did you see Oil break. What happens in the future We want too see Halekalala and there might not be no land left

sinerely

matthew Hernandez

Save the land

Julie Holy
Ilima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, HI 96706

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello. My name is Julie Holy. I'm writing in regards to the Alert flyer that was sent out about expanding the Maui airport.

I think that the expansion on the airport will cause harm to the endangered species at Haleakala National Park. The planes would cause more pollution causing the animals at the park more harm.

The airport already being only 15 miles away probably already causes danger. It would cause more danger if the airport is expanded. You would also have to cut down trees and destroy land. The trees and land that Maui's animals live in.

Please respond to my letter and think about what could happen to the wild if Muai's airport is expanded. Thank you.

Sincerely,

Julie Holy

Julie Holy

Ilima Intermediate School
91-844 Ft.Weaver Road
Ewa Beach HI. 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu HI 96805

Dear Sir:

My name is Mary Hoots and I am a seventh grader at Ilima Intermediate School. I wrote this letter to let you know that I disagree with the FAA's decision to expand the Kahului Airport.

In a recent Environmental Impact Statement written by the FAA the serious issues were inadequately addressed. The most important issue that was overlooked was the issue of introducing alien species of plants and animals into Hawaii.

If the airport were to expand and become closer to Haleakala National Park, the risk of introducing alien species into the park will increase.

I am asking you to reconsider your decision and choose not to expand the airport

Sincerely,

Mary Hoots

Mary Hoots

Janice Isidro
Ilima Intermediate School
91-844 Ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello my name is Janice Isidro. I'm a student at Ilima Intermediate School. I am writing to you because I think expanding the airport is a very bad thing to do.

Me and my classmates read the ALERT paper and I think expanding the airport will really harm Haleakala National Park. It will not only harm the land but also the endangered species and all the plants.

I totally disagree because it will do to much damage to our land. The Haleakala is one of the beautiful place on Maui so please make it stay so beautiful
Well thank you for reading this letter

Sincerelly
Janice Isidro

Seigfreid Itol
Ilima Intermediate school
91-884 Ft. Weaver Rd
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850
808-541-1243

Dear Sir:

My name is Seigfreid Itol a seven grader from inter. school and I'm in Mrs. Callahan's second period class.

I seriously think that making the airport bigger is not a good idea because first of all you have to cut down trees in order to make it bigger and that means less rainforest for the endangered species and all the animals.

When you make the airport bigger that means you guys will add more planes and that means more pollution and disturbing the animals in the rainforest.

More and more visitors will maui and some visitors might bring animals from other country and bring it in for some reason. The animals people bring in might cause a great danger to many of the endangered species in the rainforest.

Please write back to us, it is really important for us to know your answer.

Sincerely

Seigfreid Itol

Seigfreid Itol

Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50 244
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hi, my name is Jennifer Jimenez. I am a seventh grader at Ilima Intermediate School. I'm writing this letter to let you know that i disagree with the idea of having to expand the Maui Airport into the Haleakala National Park. There are many other alternatives than expanding that certain airport. I have some suggestions that I would like to share... 1) you can have another smaller airport built in another area of the island, and 2) you can have ferries built.

I respect your idea of expanding the airport, but why? If your idea of expanding the airport succeeds, I hope you know what the consequences will be and how much harm the decision will probably make to the native and endangered species in the park. Did you know that? If you knew, how come you didn't include it in the document with the newsletter? If the airport expands, many non-native species may enter the park and reproduce uncontrollably. Like it said in the letter we got,nothing can guarantee that the exotic species won't be introduced into Haleakala.

Please do not ignore the main issue here and take this letter, and many others like these into consideration when making the very important decision that will effect many people and the future to come of Hawaii.

Sincerely,

Jennifer Jimenez

Terrine Kekuanoa
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

My name is Terrine Kekuanoa and I'm writing because I strongly feel that they should pay a fight to search them and their carry on items to make sure they aren't bringing dangerous species or is pre-stand and, I also feel that they shouldn't expand the airport so that it is easy to search people than having to search alot of people and I also think it would be

less trouble having a small airport.

It also would be alot safer for the people on the island, and not having to worry about dangerous species entering the island and, I also think that it might be important to ask if other people who live on the island. I also think it would be really scary for the people that live on the island of Maui to have it turn like Guam. Could you please think about my opinion on this because, it's very important to me and, it's very important to other people who are taking time out to listen.

Sincerely,

Liliane Kekumanela
Liliane Kekumanela

Chad Kim
Ilima Intermediate School
91-889 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Admission
Box 50299
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hi, My name is Chad Kim. I am in the 7th grade at Ilima Intermediate. I disagree on what you are doing to our rainforest on the Island of Maui and I would stop it if I could but it is up to you.

If you damage the rainforest all of the animals will disapear and die. Or some of them will end up in the airports because they have no were to live and they can spread in the Airport and in other peoples homes and gardens.

Kristine A. Lacar
Ilima Inter. School
91-884 ft. Weaver Rd.
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello my name is Kristine Lacar. I'm a 7th grader at Ilima Intermediate. This letter is concerning The plan of expansion for
the Kahalui airport. We learned about this matter in our science class. I don't think having the airport expanded Would make Maui better, in fact I think it would make Haleakala be in great danger.

If the airport is to be expanded it would cover part of the park. This would make it very easy for foreigners to walk in and out of Maui with alien species of plants and animals. If the alien species escape into the park, it could destroy the native species like it did in Guam. You wouldn't want Hawaii to be the next Guam, right??

This wouldn't be as dangerous if the airport would have thorough inspections and quarantine for foreign animals. I think instead of expanding the airport , they should make another airport in another place.

They should also invite National park members to join in ,in their discussions to hear what they have to say about it.

IYou already have 3 airports and you dont need to build it bigger. You have plenty of room for people to visit.

Sincerly,

Chad Kim

Chad Kim

The future of Haleakala could change forever if the right decision isn't made. We get many medicines and cures from our native species, some are still waiting to be found. If there aren't any native plants ,Where are we Going to get cures??

Thank you for taking time out and reading my letter, I really appreciate it very much. Please take it into deep consideration.

Sincerely,

Kristine A. Lacar

Kristine A. Lacar

ROSO LAWTON
ILIMA INTERMODIATO SCHOOL
91-884 FT. WEAVER RD.
EWA BEACH, HI 96706
MAY 9, 1996

DAVID J. WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIRPORTS DISTRICT OFFICE
BOX 50224
HONOLULU, HI 96850

DEAR SIR,

I AM A 7TH GRADER FROM ILIMA INTERMODIATO SCHOOL AND I AM WRITING THIS LETTER TO YOU BECAUSE I DONT SUPPORT THE IDEA OF THE AIRPORT EXPANSION. I DO NOT SUPPORT THE IDEA OF YOU MAKING A EXPANSION BECAUSE IT WILL HURT OUR NATIVE ANIMALS AND PLANTS WHICH IS ALMOST BECOMING EXTINCT. WE DONT SUPPORT. THE IDEA BECAUSE WE DONT WANT TO LOSE OUR PLANTS AND ANIMALS. IF YOU DO MAKE AN EXPANSION THEN WE WILL LOSE OUR PLANTS AND ANIMALS

AND BESIDES ME, MANY OTHER 7TH GRADERS WILL NOT LIKE THE IDEA OF LOSING OUR PLANTS AND ANIMALS FOR AN AIRPORT EXPANSION. TO ME OUR PLANS AND ANIMALS IS WAY MORE IMPORTANT THAN A AIRPORT EXPANSION! JUST IMAGEN IF YOU WERE IN THE PLANTS AND ANIMALS PLACE AND YOU WERE GOING TO BECOME EXTINCT BECAUSE SOMEONE WANTED TO MAKE AN AIRPORT EXPANSION! SO PLEASE DONT MAKE AN EXPANSION FOR THE AIRPORT! AND IF YOU DO I CERTAINLY DONT AND WONT SUPPORT YOU!!!

SINCERELY,

Rosemarie Lawton

ROSEMARIE LAWTON

Kaeo A. Lealao
Ilima Intermediate School
91-844 Ft. Weaver Rd.
Ewa Beach, Hawaii 96706

May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, Hawaii 96850

Dear Mr. David J. Wellhouse,

Hi, my name is Kaeo Lealao. I am writing to you about my concern for the rain forests environment that is located at our beautiful Haleakala National Park on Maui. I'm really worried about the birds, trees, and the pollution that a new airport can bring. I know the problems that will happen at a beautiful National Park like this one for instance: Hawaii already has a problem with its rare birds and plant life, and we find that many statistics show that pollution's causes damages not only to plant life, but human life also. We would have so many complaints about the noise, air pollution's that this letter and others that my classmates are sending to you will be only a little portion compare to the massive concerns that will come in later on.

So lets share and voice our concern for our sister island that we know as "Maui No Ka'Oi" and her precious Haleakala National Park that we will always remember as breath taking, beautiful, and one of its kind.

Please send a respond back that will voice, and show your concern for our sister island Maui that we both care for.

Sincerely,

Kaeo A. Lealao
Student

ILIMA INTERMEDIATE "MY CONCERNS"

Kaeo Lealao
Ilima Intermediate
91-884 Ft. weaver Rd.
Ewa beach Hi, 96706
may 7, 1996

David J. Wellhouse
Federal aviation administration
airports District office
box 50244
Honolulu, Hi 96850.

Dear David J. Wellhouse

Hi, my name is Kaeo Lealao. I am writing to you about my concern for the rain forest that is located at Haleakala National Park.

I am concern about the birds, the trees, and the carbonmonixid that the plan shot out of there engine. I think that it would be a problem with the birds, and the trees.

Most of the tourist go to maui to see how the haleakala's park and I don't think the people would like to hear a plane every five minutes.

Can you writ me back soon.

Sincerely
Kaeo Lealao

Eumirjohn Leano
Ilima Intermediate School
91-884 Ft. weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Ariation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

; name is Eumirjohn Leano and I am writing this letter so I can save the Haleakala National Park and the plants and animals in the park

I think you sould not enlarge the park because if you enlarge it, where will the animals live? Also the plants will die. Also if you enlarge the park where will the endangered species and the native bird species go? Maybe there will be less tourists because there will be no tourist attraction. That is all, but I hope you save the Haleakala National Park.

Sincerly,

Eumirjohn Leano

EUMIRJOHN LEANO

Jane Lemau
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports Districts Office
Box 50244
Honolulu, HI 96850
808-541-2413

Dear Mr. Wellhouse:

I heard about you wanting to expand the airport on Maui. Well my name is Jane Lemau and I really think it's a bad idea.

I think it's abad idea because where there is a airport there's planes and planes cause polution. I also think that if you expand the airport your going to have to use more land room and your going to use part of Haleakala and your going to have to tear down some trees and where would birds go to live.

I hope that you have read this very carefully. Please try and hear where I'm coming from.

Thank you,

Jane Lemau

Jane Lemau

Aaron-Patrick Leong
Ilima Intermediate School
91-994 Ft. Weaver Rd.
Ewa Beach HI, 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports district office
Box 50244
Honolulu HI 96850

Dear Sir,

my name is Aaron. I am a boy. I am 13, and I go to Ilima Inter. I have funny looking hair, (poofy) and like to have style (baggy pants, size 30-32) colored hair & different kind of clothing (nice kind). I think I know why you like expand the airport. cause I think get bums over there so they get room for sleep yah! And plus probably need somemore room for the take off place. well, wright back man.

Sincerely,
Aaron Leong

Aaron Patrick Leong

JUSTIN.M.LEWIS
'UMA INTERMEDIATE SCHOOL
J1-884 Fl. WEAVER ROAD
EWA BEACH, HI 96706
MAY 8,1996

DAVID J WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIRPORTS DISTRICT OFFICE
BOX 50244
HONOLULU, HI 96850

DEAR SIR:

My name is Justin Lewis. I'm a student of Mrs.Callahan. A few days ago she received a letter saying that you guys are going to extend your airport.

Now understand you are only doing what you think is best for tourist and stuff.But ,think about it. If you have any children would you want them living in these beautiful Island with alien species that can harm your grandchildren? Besides why would any tourist come if they find out that we are surrounded by treesnakes?

Most of all the islands money comes from tourist and the people of these islands get pretty mad if they foun out the island was full of snakes.Ifyou guys were smart you wouldn't have important meetings without important people.Especially when your thinking about destroying important rainforest land. I think all of you guys should sit down and talk about this.

Sincerely
Justin Lewis
Justin Lewis

Rhiannon Lieces
Ilima Intermediate School
91-884 Ft Weaver Road
Ewa Beach, HI 96706

David J Wellhouse
Federal aviation administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr Wellhouse:

My name is Rhiannon Lieces from Ilima Intermediate and I'm in the 7th grade. The reason why I am writing to you is because I think building on to Mahulul airport is wrong because you can bring many non-native animals to Hawaii that are not being hunted by our native animals. Also I think people from the mainland might bring drugs to plant or to sell them to young teen-agers I also think having a small airport is good

I also strongly beleive that if you don't make another airport people on the islands will be safe from other dangerous species. I don't want the island of maui to be like guam. Please read over my letter because it's important to everyone who does not want a bigger airport

Sincerely

Rhiannon Lieces

Macadaeg Loreto Jr.
Ilima Intermediate School
91-884 FT. Weaver road
Ewa Beach, Hi 96706
May 6, 1996

David J. Kellhouse
Federal Aviation Administration
Airports District offic
Box 50244
Honolulu, HI 96850

Dear Sir:

I am Loreto macadaeg Jr. a student in Ilima Intermediate school. I don't like the idea of making the airport bigger or longer because animals can get hurt and ~~kill~~ even get killed. If animals in the forest get killed their kids wouldn't be in the future or there would be any future for animals. I am just telling you this because I like animals and if your kids want to see some animals there wouldn't be any animals to show them because they get killed by the construction of the airport. Thank you for listening to my opinion.

(In the back)

Sincerely,
Loreto Macadaeg
Loreto Macadaeg Jr.

Roxlo Myoni
Aiea Intermediate School
98-884 Ft. Weaver Rd.
Ewa Beach, Hi 96706
May 8, 1996

David F. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu Hi 96850

Dear David F Wellhouse:

Hi, My name is Roxlo Myoni, I'm 12 years old and I go to Aiea Intermediate School. I'm writing this letter to tell you not to build a bigger airport because it could be very dangerous. I'm going to tell you why is it is dangerous to build a bigger airport.

It's dangerous because the more bigger you build the airport the more planes come in and also pollution can destroy to the ozone layer. And plus if you to build a bigger airport the more planes land and the more people come on the island and the only thing those people do is pollute. Then Hawaii will be more pollute then it was befor. Everything will be destroyed and damaged.

It's also dangerous because snakes can crawl on a plane and be dropped off at Honolulu. And then all the endangered species will all die and will be destroyed. The birds will be extinct and most other animals. And if this does happen we better hope the the mongoose will kill the snakes

sincerely,

Ronib Magonis

Ronib Magonis

Alima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI, 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports district office
Box 50244
Honolulu, HI, 96850

Dear Sir:

Hello! My name is Heather Malia. I am a 7th grader at Alima Intermed. I am writing to you because I am concerned about Haleakala National Park. I am not in favor of expanding the airport because non-native species will destroy the land and also invade the park.

You should also let a person from Haleakala to be included so you can

See how they feel about this
You should also think of the park
and the animals needs because
they may die because of the
pollution from the planes.

I for one will be very
mad because if there are no
parks to see there will be
no tourists who come to you.
expand the airport all workers
at the park will eighther have
little pay or no job at all.

I know alot of people who
are not in favor of expanding
the air port because some of
their relatives live there and
they won't have a place to
go for a nice picnic or
to look at because of the airport
Please don't expand the airport
because we won't have a place
to goto anymore.

Sincerely,
Heather Malia / Heather Malia

ILIMA INTERMIDIATE
91-884 FT WEAVER ROAD
EWA BEACH HAWAII, 96706
MAY 8 ,96

DAVID J, WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIRPORTS DISTRICT OFFICE
BOX 50244
HONOLULU , HI 96850

Dear sir:

I am a 12 year old student in seventh grade , from Ilima Intermidiate. I am writing to you to tell you that I disagree with you on the subject of making a new airport in the Island of Maui.

If the state will aprove in making a new airport I would have to say that you people are making a big mistake because there will be alot of negative things happening like for instance there will be al of new kinds of spiecies of animals coming unto th island and very near to that new airport are alot endangered spiecies, and then from that airport people from all over the world might come.They might be carrying wild diseas that us humans or those endangered spiecies havent got in contact with yet.
Then those animals who are endangered could die very fast like a domino effect.

While that is happening the animals of the island is what helps to bring our tourist economy making money. So then if all those beautiful animal die and some are mostly found here in Hawaii the tourist just might think to themselves and say HEY there is no reason for us to go to Maui if there aint no kinds of beautiful animals living there so thell just go somewhere else for their vacation and if they do decide to do that there wont be much of a reason for a new airport. And besides if you do make a new airport you will lose alot of fertile agricultual land because it will have to be demolished.

SINCERLY,

Leilani Marcella
LEILANI C MARCELLA.

Jensen K. Mata
Ilima Intermediate
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports Distric Office
P.O. Box 50244
Honolulu, HI 96850

Dear Sir:

I am 12 years old and I go to Ilima Intermediate School. I am writing this letter to tell you my opinion on why you shouldnt expand the Kahului Airport.

I think you should not expand the airport because if you do you are putting the endangered species in more risk of becoming extinct. One more reason you should not expand the Airport is that the Haleakala national park is going to decrease in size. If this happens people wont be able to [redacted] walk around and see the animals in the park. I also think that it is bad because the EIS didnt establish inspection quarantine Procedures for the Airport.

I would like to get a response on why you need to expand the Airport because if you extend the Airport its going to be good for the people but bad for the endangered species because they are going to die out and their would be no more Haleakala National Park.

Sincerely,

Jensen Mata
Jensen Mata

Nicole McKeague
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa beach, HI, 96-706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI, 96850

Dear Sir:

My name is Nicole McKeague from Ilima Intermediat school. I'm writting to you because I am concerned about the EIS. I disaggree with them in not checking bags and expanding the Airport also includeing the FAA. They must keep on checking bags with extra security such as dogs. It can be just as easy to say no I have no animals or plants," and go on there merry way. Everyone's and Everythings lifes are endagered with an expansion or/and not checking bags. We must protect Hawaii.

You also need to include the National Park Service [redacted] on discussions They deserve to have a say in things.

Sincerely,
Nicole McKeague
Nicole McKeague

Lyra Mendoza
Ilima Intermidiate School
91-884 Ft Weaver Road
Ewa Beach, HI 96706
May 8, 1998

David J. Wallace
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Deapest Sir:

Hello! Hi my name is Lyra Mendoza and I'm in the 7th grade and go to Ilima! Thats in Ewa Beach. My teacher that showed us what was happenning is Mrs. Callahan our science teacher.

I'm concerned about the expansion of the airport that will be taking place soon. I was wondering why do such a thing when there is so much money and man power to make this happen. You could use all that other stuff to help. Nature by not making an expansion instead of wasting it on an airport why not use it to help nature causes then recking natures habitat it was there first.

The following reasons I think you should not waste your money for an expansion of an airport is: 1) New specits that are not wanted may aboard our planes and cause a peck to people and there homes. People could get hurt by these sneaky specits 2) The money ain't worth expanding an airport. We all ready have interfered with nature 3) It wouldnt help help buldiing it on top of nature so that means your going to have to distroy nature and animal homes. 4) why waste man power when all that man power when all that man power can help clean and make it a better place.

I really hope this letter and my class-mates letters help you change your mind. Thank you for taking the time to read my letter!

Sincerely,

Lyra Mendoza

Mary Jane O. Menor
Olema Intermediate School
91-844 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Mary Jane O. Menor, student of Olema Intermediate. I am writting to you because I think expanding the airport is not something alot of people want.

Me and my classmates read the AEIRS paper and I think expanding the airport will really harm Haleakala National Park. It will not only hurt the land but the endangered species and plants in its habitat.

I know there are many visitors there but we have to think about what will happen after. We have to think about the damage and good that will come out of it. I totaley disagree with it because it will do much damage to our land. Haleakala is one of the most beautiful sights of Maui, please make it stay beautiful. Much of Hawaii's land is being taken away. There is to much concrete covering our lands & forests. Please try preserve our land that we have now, for they are very precious to me and alot of other people. If you take it away from us, it will be gone forever!!!

Thank you very much for taking your time and reading this.

Sincerely,

Maryjane Menor

Mary Jane O. Menor

Abeni Millan
Ilima Intermediate
91-884 Ft. Weaver Road
Ewa Beach, Hi 96706
May 9, 1996

David J Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello My Name is Abeni Millan. I am a 7th grader in Ilima Inter. I am so mad at you guys. Want to disturb Haleakala National park for a Bigger Airport where are you guys going to put all the animals? I hope you guys dont take a Bigger Airport. PLEASE think it over Before you do it.

Sincerely,
Abeni Millan
ABENI Millan

Jadyn Molina
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello! My name is Jadyn Molina. I live in Kapolei, here in Oahu. I am writing this letter to you because it can harm many endagered species. If international flights start landing without such procedures, the chances of disaster striking are multiplied immeasurably.

Sincerely,

Jadyn Molina
Jadyn Molina

Ryan W. Mossman
Aiea Intermediate School
91-889 Ft. Weaver Rd.
Ewa Beach, Hi. 96706
May 8, 1996

David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi. 96850

Dear, Mr. Welhouse:

Hi, My name is Ryan Mossman and I 14 years old. I go to Aiea Intermediate. I am also in the 7th grade. I disagree with the expansion of the airport.

One of the reasons is that you could hurt the animals. One way you can hurt them is by all the pollution the planes will make. And also how irritating the noise will be.

It also the will be bad for cars all the noise will scare off the animals. why'll you'll be looking at them. It will also be less enjoying listening to the noise of the airplane. And those are my reasons why I disagree with the expansion of the airport.

Sincerely,

Ryan Mossman

Ryan Mossman

Ayja Nakasone
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 9, 1996

David J. Wellhouse
Feaderal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hi, my name is Ayja Nakasone. I am a 7th grader at Ilima Intermediate School. The reason why I'm writing to you is to state my reasons why I'm against the expansion of the Kahului Airport.

One reason is the care for the land. If a single seed is to get attached to a wheel, then right before the plane lands, the seed falls to the ground in the dirt. Anew alien plant, which is unknown, is introduced to it's new tropical home. How will the native plants react to it? What about the birds and animals that live there? What affect will it have on them?

Second reason is the pollution. If more planes are using gas, it will create smoke. More pollution can affect people with health problems.

Third reason is temperatures. If you make runways for the planes, that'll be made of concrete, will bring up the temperature of that part of the island. Like the Honolulu International Airport, the concrete creates heat causing Honolulu to be hot. The same will affect will happen in the future if you do build the airport.

I thank you very much for listening to my reasons. I hope you will reconsider.

Sincerely,

Ayja Nakasone
Ayja Nakasone

Joycelyn P. Natividad
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, Hi. 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu Hi. 96850

Dear Sir,

Hi! My name is Joycelyn Natividad. I am 12 years old and I come from Ilima Intermediate School as a seventh grader. I am writing to inform you to how I feel about expanding the airport.

Well, I don't think its a good idea. The FAA said, "airport expansion would pose no threat to endangered species." They are wrong. It will because if you drive these animals out of their natural habitat, they can die, and we won't have anymore of them.

And why doesn't the EIS establish inspection

and quarantine procedures for the airport. If alien species are not controlled, then every endangered species are surely to die. We may even be endangered. What if we caught a virus from the alien species? I think you should establish inspection and quarantine procedures for the sake of our lives.

We must help save Haleakala and all the endangered species because once they are gone, that will be the end of them. You can always make another airport, but you can never bring back extinct animals. So please, save them before its too late.

Sincerely,

Joycelyn P. Natividad

Joycelyn P. Natividad

Noreen Olaguer
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach,Hawaii 96706
May 8,1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, Hawaii 96850

Dear Mr.Wellhouse:

My Name is Noreen Olaguer , 7th Grade Student of Ilima Intermediate School . I write to you because I do not agree with making the airport bigger and take the part of Haleakala . The information I found out that it's already indicated it's belief that airport expansion would pose no threat to endangered species . It means it's non-native species . so, don't even think about it.

If you see the Haleakala National Park, you will be relax and surprise . . . . . SURPRISE you got a free tour in this park, only thing it's writing tour . If you look all the animals in this park and open your eyes and heart to see the truth, you will see the friendly animal and just like us, looking for a shelter and food for their family .please ,try to understand.

Look at your airport; is it too small or too big enough to expand. Do you know what cause of expanding the airport? I think you're smart enough to know it. Only thing, you don't care. All you care is business . . . some business can kill the beautiful environment just like your business.

So please, stop this non-sense. All you want is money. Let the people relax in the park and let the animal get there needed. If you think that expanding the airport is good enough, think again. So please, save our environment, save our life and save our future.

Sincerely,

Noreen Olaguer

Noreen Olaguer

Cherina Ontai
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach Hi 96706

David J. Wellhouse
Federal Aviation Administration
Airports Districts Office
Box50244
Honolulu Hi 96850

Dear Mr.Wellhouse:

My name is Cherina Ontai. I'm writingtis because I don't agree with you. You shouldn't expand the kahului airport, you have enough space for all of those planes anyways.

I don't think you should do this because you will pose a treat to endangered species and all of the birds won't have a place to live. You should make the airport somewhere else.

Well I hope you take my advice and don't make the airport and ruin Haieakala. Maake the right decision.

Mahalo,

Cherina Ontai

Cherina Ontai

Kharen Paguio
ILIMA INTERMEDIATE
91-884 FT. WEAVER ROAD
EWA BEACH, HI. 96707
MAY 6; 1996

DAVID J. WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIRPORTS DISTRICT OFFICE
BOX 50244
HONOLULU, HI. 96850

DEAR MR. WELLHOUSE:

MY NAME IS KHAREN PAGUIO. I'm a 7th grade [redacted] STUDENT OF ILIMA INTERMEDIATE SCHOOL. I think that expanding the airport would affect the enviroment, forests, animals, people and plants. THE animals WHERE THEY NORMALLY AND NATURALLY LIVE WILL HAVE NO space around the forest for them to LIVE IN BECAUSE OTHER animals need a PLACE TO LIVE.
IT MAY OR MAY NOT DESTROY THE park, but it could take a long time to fix the natural beauty of the island. So I'm just writing to give you a little bit of advice.
PLEASE THINK ABOUT THE enviroment FIRST, BEFORE DOING anything TO THE AIRPORT.

Sincerely,
Kharen Paguio
(Kharen Paguio)

Tiffany Palmeira
Ilima Intermidiate School
91-884 Fl Weaver Rd
Ewa Beach Hi 96706
May 6, 1996

David J Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu Hi 96850

Dear Sir:

My name is Tiffany Palmeira and I am a student at Ilima Intermidiate. I am very concerned about you expanding the airport in Maui and I strongly disagree with your idea.

Following are a couple of reasons why I disagree: First of all many non-native species may come into Haleakala. They may kill many of the native animals. Let the birds have a chance to experience

Hopefully you will understand my words.

If you are going to extend the airport you could try to get some inspectors, there, so non-native species or bad things cannot come in.

And last but not least, if this was so important why didn't you invite a Haleakala person to discuss this situation. Please listen. Thank you very much!

Sincerely,
Tiffany Palmeira
Tiffany Palmeira

Eleni Papakiristis
Ilima Intermediate School
91-884 FT. Weaver Road
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

I am seventh grade student at Ilima Intermediate who is writting a letter in regards to the expansion of the Kahului Airport on Maui. I would like you to know that I think the expansion of the Kahului Airport is totally unnecessary because we already have 6.5 million or other people flying in a year, isn't that enough? Because of this expansion Haleakala National Park will be cut off and all endangered species will be extinct. Do you want this to happen? Obviously, otherwise you would stop this expansion immediately. Did you ever stop to think that maybe the cure for aids, cancer, leukemia, or any other type of disease is in one of those plants in Haleakal National Park? If you did you would not want to ruin this beautiful place. I am not saying that I'm some sort of environmentalist or something, but I just want to save a beautiful land mark.

Yet the Federal Aviation Administration states that no harm will be done towards the endangered species of Haleakala, but if you build over it something is going to get smashed or killed and that's a true fact. If flights land on the park all kinds of non-native species will land with it. If a bunch of animals and stuff come to Hawaii that plants or something we don't have, it will eat all of our other native species. Why can't you people just let Haleakala National Park be?

Another flaw in this expansion is the searching process. If the FAA and Department of transportation does not search baggage and people thoroughly you can have people smuggle all kinds of things into Maui. The environmental impact statement fails to make a excellent and thorough search within the airport which shall and most likely cause chaos in the species area. It also needs a quarantine procedure. Hopefully you will make the right decision, the decision to cancel the Kahului expansion on Maui.

Sincerly,
Eleni Papakiristis
Eleni Papakiristis

Andre Patrick
Ilima Intermediate School
91884 Ft.Weaver Rd.
Ewa Beach, HI. 96706
1996 may 7

David J. Wellhouse
Federal Aviation Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse

Hi, My Name is Andre Patrick. I go to Ilima Intermediate and I'm in the 7 grade. I am writing this letter to tell you my opinien about making the airport bigger in Maui. I think they should make the airport bigger so it can hold more people. When peole come to an airport they don't want to be squished in, they want to have space.

Sincerely,
Andre Patrick
Andre Patrick

Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir,

I am Bronson Paulo from Makakilo. I am 7th grader at Ilima Intermediate. I have 4 bro there no sisters. I played football for the Makakilo Warriors and I played for 4 yea I don't want you guys to build a bigger airport because there are endangered specie around Halekala and they could become

extinct. Then there wouldn't be any animals to look at. They shouldn't expand the airport just let it be.

It is important to help save animals that may become extinct because of the airport expansions. Help save the futu for the animals and the people that goes there everytime to see the animals and have a party and save the earth for the animals and all of us.

Sincerely,

Bronson Paulo

Bronson Paulo

Tanya Pender
Ilima Intermidiate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI, 96706
May 7, 96

David J. Well House
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Tanya Pender. I'm 12 and I go to Ilima Intermidiate School. I am writing this letter to help out in the E.I.S. I think people who come to Hawaii should not bring animals like Snakes, Alagators, Animals like these are not common in Hawaii. Some people let their Snakes go, So they can live better on their own. Instead they

Should Kill them or Sell them to the pet Shop So they dont multiply. The F.A.A Should help by not bringing animals that are not common in Hawaii. It doesn't matter if it's their fuorite pet they Should not bring it, The Airport Should be more Strict on bringing pets to Hawaii. Also I think they Should expand the Airport another way Instead of ~~takeing~~ the rain forst. They Should leave the Rainforest alone and its habitat. Thank you.

Sincerely,

Tanya Pender

Reza A.G. Perez
Ilima Intermediate School
91-894 Fort Weaver Road
Ewa Beach HI, 96706
May 7, 1996

David J. Hallhouse
Federal Aviation Administration
Airports District Office.
Box 50244
Honolulu HI, 96850

Dear Sir:

I'm a student at Ilima Intermediate. I have read your newsletter and decided to help. Expanding the airports is a good idea but the noise is very annoying. If they expand the airports, they should keep the start landing procedures (the capacity of the airplanes) unknown to our knowing. If they destroy the forest, they destroy the future of many children. What if there was a cure for Cancer or A.I.D.S.? And we never knew because All of them have

it down. I know as you read, you think what a crazeminded student. I care for our Rainforest as well as our well being. Why destroy an area of fertile land. About 60 billion tourists come to Hawaii, Why do they want more, more, more, more. That's all they it is all. Thank you for your time, and reading my letter.

Sincerely,

Rieza Ann Perez

Diane Puahi
Ilima intermidiate school
91-884 Ft. Weaver Road
Ewa Beach, Hi. 96706
May 7, 1996

David J. Wellhouse.

Federal Aviation Administration
Airport district office
Box 50244
Honolulu Hi. 96850

Dear sir,

I think it is imposible to build an airport couse you can't put the airport on our Hawaiian island land. Couse it belongs to us Hawaiians. You should not build the airport cause it would be to not cause Haleakala means "House of the sun". But it also snows up in Haleakala. And they might also destroy our plants and trees.

Sincerly,

Diane Puahi

Mark Real
Ilima Intermediate
91-884 Ft. Weaver Rd.
May 9, 1996

David J. Wellhouse
Federal Avation Administration
Airports district Office
Box 50244
Honolulu, Hi 96850
808-541-1243

Dear Sir:

My name is Mark Real I am 13 years old.
I feel that you are being unfair to the people of Maui.
My other friends feel the same way I do.

By expanding the airport it will effect the wildlife around the airport. the incoming aircraft from Guam might have snakes and with the forest really near the forest and the chances of finding that snake is slim.
Please think about what might happen to the wildlife if you extend the airport.

please respond

sincerly,

Mark Real

Rachael Rigsbee
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI. 96706
May 9, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI. 96850

Dear Sir:

My name is Rachael Rigsbee. I am 12 years old, and in 7th grade. I have input on your Idea of expanding the airport on Maui.

The expansion of the Kahului airport

Kimberly Rabago
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David J Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Kimberly Rabago. I am a 7th grader at Ilima Intermediate. I do not agree with the Airport Expansion on Maui because it will affect many endangered species. The animals will die if they have no plase to go. And there would be lots of noise if you build the airport by the park. It's not right to take the Haleakala National park away because it is very very important to the endangered species. So please think it over before building an airport.

Sincerely,
Kimberly Rabago

Kimberly Rabago

Luela Ramos
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Ariation Administration
Airport District office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi, my name is Luela Ramos. I'm 12 years old and I attend Ilima Intermediate. Recently my class and I have read the issue in which concerned the Haleakala National Park and the expansion of the Kahului airport located in Maui. I'm writing this letter to express my point of views on this topic and to tell you that this is a big mistake.

The Haleakala National Park is probably the best reserved piece of tropical rainforest. As you already know, the airport of Maui is located next to the park and is planning to expand itself. The airport would probably run through the park and if it does then what would happen to all the exotic and interesting species? Where would they go? You'd be taking away something that belongs to them, their home. You'd make them more endangered and not only that, you'd make them extinct.

Please think about the consequences so that the young children of Hawaii would enjoy life the way we do today. Please, there's already so many problems in this world that's not solved, don't make this one of them. Please think it over and reconsider because if we don't save our endangered species today, there's not a chance of saying "Hi" to them tomorrow. Thank you.

Sincerely,
Luela Ramos

Luela Ramos

on Maui will effect the Haleakala national park greatly. Gasses from planes will cause much pollution. Trees and animals may be harmed. Some plants could die. The loud sounds can scare the animals.

More planes could mean more trouble. The expansion would mean some of the park would have to be cut down. Some of the animals would be forced to find new homes. Endangered species (which Haleakala national park has more of than any other park in the United States) could even become extinct. Some foreign animals (such as snakes and some lizards) could accidentally get on a plane. The same thing that happened to Guam could even happen here. Snakes would ruin Hawaii's natural habitat. There aren't any predators of the snake here. Many endangered birds could be killed.

Write back your input on this subject matter. Preserve as much land (forest, rivers) as possible. Keep Hawaii as beautiful as it is now!

Ilima Intermediate School
91-5271 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse:

Hello! My name is Kapeka Robello and I'm a 7th grader at Ilima Intermediate School. I'm 12 years old. I'm writing to you because I disagree with what you are going to do, if you Expand the airport did you Know that you are killing endangered Species. Do you want to Kill Species that haven't done any thing to you or do you just want a bigger airport so even more people can come and use. won't have any cute little or big animals that are so nice to us. Did you Know animals are why people come or no? you to busy making the new airport.

Think for awhile before you do anything
I mean your just stepping into things.
Now Mr. Wellhouse do you enjoy killing
or what I call murder in the 3rd degree
you are killing the sweet morning songs
of the trees. Did you know that living
things have a unique back round to a picture
thats how maui gets its beauty. Trees,
and Animals give there beauty to the Island
of Maui for a reason I am reason only be-
cause Maui has fresh air + people don't
pollute as much as they do in Hawaii.

Maui is very beautiful island, don't mess
it up please its an loving island. If
you hurt the island you hurt the
people of the island.

Sincerely,

Kapeka Robello

Kapeka Robello

Thomas C. Roberts
Olima Intermediate
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse

My ~~name~~ name is Thomas C. Roberts and I am in the 7th grade. I don't want you ~~+~~ and your people to expand the airport because it might cause many problems with the survival of the area.

It is important to help save ~~an~~ animals that may become extinct because of the airport expansion

Sincerely,

Thomas C. Roberts

THOMAS C. ROBERTS

Isabel ROBERTA RODRIGUES
ILIMA INTERMEDIATE SCHOOL
91-849 FT. WEAVER RD.
EWA BEACH, HI 96706
MAY, 8, 1990

David J. Nellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi, my name is Isabel R. Rodriguez I'm am a 7th grader at Ilima Intermediate School. My opinion is ~~to~~ don't make the airport bigger because the airport is only 15 miles away from Haleakala. If you make it bigger more airplanes are going to come and more polution is going to come. ~~If~~ So please be nice to our forest before the animals die & there won't be anymore cute little for us to look at.

Excuse me Mr. Nellhouse but how do you know that if you make the ~~airport~~ airport bigger the airport would ~~pose~~ no threat to the endangered species. and why do you want to make the airport bigger. People are worried about this decision you have made. People don't want you to make the airport bigger. ~~Mr.~~

Mr. Wellhouse. If we wanted the airport to bigger we would tell you but we don't want it to be bigger. It could kill the animals and when airplane come in or go out snake might go to wherever we and kill people or birds. Please don't make it bigger. We're depending on you.

Sincerely,
Isabel R. Rodrigues

ISABEL R. RODRIGUES

Manuel Rosario
Ilima Intermediate School
91-884 Ft.Weaver Road
Ewa Beach, HI 96706
May 7,1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

I'm a student at Ilima Intermediate School. I think you are unkind and greedy for money. Some of these plants might cure diseases and some cancers, but no,you want to expand the airport that you work at into the park. If you don't want any problems with the park, you'd ought to expand the airport the opposite direction to not take over park space.

If the EIS deosn't have inspection and quarantine procedures anybody can go in the airplane with illegal things into the airplane and kill someone you may be out of a business for not having a inspection procedure. And if a sick person comes into the plane and gets everyone sick you and your job has to pay the medical bill.

If they excluded the park from any discussions it could be because you did something to them that they don't invite you to any discussions, but it could be that they think you have no problems and your the best.

Sincerely,
Manuel Rosario
Manuel Rosario

Michael Sanchez
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear David J. Wellhouse

Hi my name is Michael Sanchez and I do not support the airport because you might put the Haleakala National Park in danger and there are a lot of animals in there and they might become extinct. That in my opinion so don't make there airport bigger its fine how it is

Sincerely,

Michael Sanchez
Michael Sanchez

Christina Scott
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, Hi. 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Sir:

My name is Christina Scott. I'm writing this letter because I do n support the expansion of the airport. As I understand it, this expansion would go over the Haleakala park. This park is t home of many endangered species. Of course I trust you know th and that endangered species are the most beautiful of animals, an we realize this only when they become extinct. So I trust that you also know that if you do decide to expand, (at wich I strongl disagree with) that you will kill all of the endangered species and other animals that call it home. And in doing this, you will also ki all of the hopes and hopines of the people.

Many people will hate you and not use you airport, and you will run out of buisness. I trust that you now [illegible] this is a bad idea for you and the [illegible]. I don't really [illegible]

to go out of buisness. I also think that we should also try to save the inhabitants already on the Islands.

Sincerly,

Christina Scott

Christina Scott

Tiare Shigaki
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hello. My name is Tiare Shigaki. I am notifying to be my concern that expanding the airport is not a very intelligent thing to do.

I have been to Maui and I have seen Haleakala. I really think it's beautiful. When I went to Maui with my other school Island Paradise Academy it was my first time going up there to see the sunrise. I was so excited when I was there. I liked it so much that I promised myself that one day when I older I would come back. Well now it seems to my concern that there won't be another peaceful, and beautiful place like that if you are going to expand the airport.

It may seem that you guys do not have money but there goes some more money to expanding the airport. If you just spend your money wisely then waisting a chance on expanding the airport and getting illegal things imported then thats a big chance to take. Picture it this way if illegal animals were to come

we might loose the things that only Maui has, like the silver swords wich takes approximately twenty years to grow.

I just have one thing to say Haleakala is the most beautiful place to go in Maui and if you guys do expand the airport there will be a lot of disappointed people.

Sincerely,

Tiare Shigaki

Tiare Shigaki

Joslyn Silva
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach Hi. 96706
May 10, 1996

David J. Well house.
Federal Aviation Administration
Airports District Office.
Box 50244
Honolulu Hi, 96850

Dear Mr. Wellhouse:

Hello. My name is Joslyn Silva and I am 13 years old. I am writing this letter to tell you how I feel about your expanning the airport on Maui. I am against you on expanning the airport.

It seems like you guys are only thinking about yourself. You should think about the animals and the other people against the expansion.

You may not take me to sericusly because of my age. But I am serious.

There are endangered animals in the park near by or have you forgotten. If you expand the airpert you will kill the animals and then there will be no other animals like them left.

So I just ask you to please re consider your idea. Hope fully the letters will help you too.

Sincerely,
Joshua Silva

David Smith
Ilima Intermediate School
91-894 Ft. Weaver Rd.
Ewa Beach, HI. 96706
May 7, 1996

David J. Wellhouse
Federal Ariation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Mr. Wellhouse

I think you should not enlargen it because it is large enough and is working good at the size it is. If you enlarged the airport it would kill one of the most preserved rainforest in the world. I do not think you should expand the airport because 1.6 million people a year come to look at the rain forest. If you expand the airport 1.6 million people will be mad. The airport would kill alot of plants and animals. When plants and trees die there is less oxygen and if we keep killing plants they will all die and we will have no oxygen. I think you should not expand the airport because turn

it would make the world a better place.

Sincerely,

David Smith

David Smith

Steve Soares Jr.
Iliima Intermediate School
91-384 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

I'm Steve Soares Jr. I'm a 7th grader at Iliima Intermediate. I disagree with you about expanding the airport on Maui because there are a lot of endangered species near the airport in Haleakala National Park. If you build the airport bigger, then the species will become extinct. Then there will be even more species coming in through the airplanes and they might eat our plants. So don't build the airport any bigger "please."
Thank You for Listening!

Sincerely,
Steve Soares Jr.
Steve Soares Jr

Sunshine C. Spotts
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, H.I. 96706
May 7, 1996

David J. Wellhouse
Federal Ariation Administration
Airports District Office
Box 50244
Honolulu, H.I. 96850

Dear Sir:

My name is Sunshine C. Spotts. I am a 13-year-old seventh grade student in Ilima Intermediate. I am writing this letter to let you know that I have a lot of reasons to agree and disagree with you expanding the airport towards Haleakala. You might think that reading this letter is a waste of time, especially when it's from a 13-year-old kid. But I just wanted to ask you a few questions and Like I said before, I am going to give you a lot of reasons why I agree and disagree about making the airport.

Have you ever thought that if you make this airport, you might have to cut down some trees? You might even kill some plants and animals. If you kill the plants and trees, there will be less oxygen for us. With more airplanes, there will be more pollution. Don't you think there is enough pollution on Hawaii? I've been to Haleakala twice. I've seen some beautiful birds there. You can't close down the Haleakala National Park (which is very important in Hawaii) just for an airport!

This National Park helps to try to save the Nene goose. Some stories about Pele are in there. You can't destroy some of Hawaii's history! Why couldn't you just build some more buildings in the Kahului airport? Why couldn't you just expand the airport right there in Kahului?

Now, that is just some of my disagreement about the expansion of the Kahului airport. I want you to stop and think about the importance and unimportance about make the bigger Kahului airport.

I kind of agree on making the expansion because there will be more jobs for people who can't get a very good job. This expansion might be a great opportunity for teenagers to get a part-time job to pay for college.

I will not say that I agree with you. Nor will I say I disagree with you. You will get other letters from other kids saying they agree or disagree. I cannot make up my mind, but for now I believe I disagree with you because of the reasons that I wrote in the beginning. You might feel hurt but think of the trees,plants, animals, and other people you might hurt. Please stop and think before you do the expansion!

Sincerely,

Sunshine C. Spotts

Sunshine C. Spotts

Charline Stephens
Ilima Intermediate School
91-884 Ft. weaver Road
Ewa Beach, HI. 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airport District Office
BOX 50244
Honolulu, HI. 96850

Dear Sir:

Hello! I am a concered 7th grade student from Ilima Intermediate school. My concern is on Haleakala National Park. It is most likely true that Haleakala National Park is one of the best preserved peice of tropical rainforest in the National Park system, and if you, yourself think it is one of the best preserved National Parks, then why ruin it by adding more property to the Kahului airport. There is absolutely no sense in adding something you don't need, you want it, but you don't need it. I am absolutely sure their is enough room in the Kahului airport for everyone coming from different states, countries, or from any other island.

My concern and attention is also turned to the fact that you do not check what the tourist bring on to the island. Some of these people might bring speices on the island of Maui that do not exist on this island, and these speices could multiply, and have no choice, but to eat our plants and animals if we do not have its source of food. Well, I know its not my decision, but if I were you I would make the decision that is the best and the majority of people agree on. GOOD LUCK!

Sincerely,

Charline Stephens

Charline Stephens

Silvestre G. Suga III
Ilima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, Hawaii 96706

David J. Wellhouse
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, Hawaii 96850

Dear Sir:

I am 13 years old and I go to Ilima Intermediate School. I am writing this letter to tell you about my opinion on the expanding of the Kahului Airport. I definitely disagree about this, because if you do this the airport will be closer to the forest and might also kill Maui's endangered plants like the as the Silversword. You will also be destroying the habitat of the animals that live in the forest, like deers, Nene goose and Wild boar pigs.

I also feel that by making the airport larger, less tourist will come. For one reason, tourist come to Maui to see the beautiful scenery, not to look at big buildings and cement! Take Oahu for instance, hardly any tourist come to Oahu, because theres more buildings and concrete than forest. So if you make the Kahului Airport larger, you will just be wasteing your money. Most people who come to Maui, are trying to get away from the city. They come to Maui to see the beautiful rainforest and crystal clear beaches.

If you were smart, you wouldn't expand the Kahului Airport. If your reason is to get more tourist you should use your money more on making the forest and beaches better. If you dont agree with me on this, then I would like to ask you nicely to write me a good reason why you should expand the Kahului Airport.

Sincerely,

Silvestre G. Suga

Silvestre G. Suga

National Parks Conservation Association

Gladis Sumbad
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa beach, HI-96706

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI-96850
848-541-1243

Dear Sir,
Hi my name is Gladis L. Sumbad, and i am 12 years oid
I am writing to you because i am going to tell you my opinion on Hawaii Parks Alert.
Ithink that Mauis only Airport shouldnt expand because it is good just the way it is. and if you guys expand the airport you guys are going to take up some space of the Haleakala Ntional Park and if you do that the 1.6 million people who go there a year that enjoys it wont enjoy it any more.
Ialso think you guys shouldnt expand the airport because than you guys are going to use machines to build the airport and that will cause palution and we already have enough palution on this earth to take care of.And you guys are also going to disturbe the people who live close to the Airport with the noise you guys are going to make with the machines you guys are going to build the Airport with the noise.
And i also think that you guys shouldnt expand the airport because than you guys are going to cut down alot of trees just because you guys want to expand the airport you guys are just going to waist the trees because the airport is good just the way it is,and trees are just going to keep diappearing if people like you keep cutting down trees for no good reason because the Airport in Maui is already good enough.

Sincerly,
Gladis sumbad
gladis Sumbad

Lance Sunio
Ilima Intermediate
91-884 FT.Weaver Road
Ewa Beach,HI 96706

David J.Wellhouse
FEDERAL AVIATION ADMINISTRATION
AIRPORT DISTRICT OFFICE
P.O. BOX 50244
HONOLULU,HI 96850

Dear Sir,

I am Lance Sunio and I am in the seventh grade.I am 12 years old and in Ilima Intermediate school.I am writing this letter because I think that expanding the airport is not a good idea.It can make it more dangerous to to humans and other living things.It could be dangerous because if a person goes where an animal lives it could attack that person because it was tring to protect its home.

Iwant to know why you want to expand the airport,because,don't you think it will make it more safe for the animals?If you expand the airport the land and all other species,could make a big difference on the national park.It could make a big difference because the land will have a little space.

If you did not expand the airport I think that it would be more safe for the national park.IT can also keep the national park a very beautiful place One very bad plan can ruin the whole forest because the animals will have a little space to live on.

Sincerly,
Lance Sunio

Marc Paul M. Susa
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 8, 1996

David J. Wellhouse
Fedaral Anviation Administration
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi, my name is Marc Paul M. Susa from Ilima Intermediate School, Ewa Beach. I was just concerned about what your going to the Haleakala Park and the Maui Airport. Some kids in our Science Class think that you should expand the Airport the oher way instead of expanding it torward the Park. What's the point of making the Airport bigger? Besides what will happen to the indangered speceis that live in the Park? If you tore apart half of the Park, What else could the tourist see? Only damage Park destroyed by your Man. Think of the future will be like with no Park to go to , and what if this will be the last Park in Maui or even the whole Island of Hawaii.

Think before you plan anything to do with the Park. I hope you take your time to stop and think about this.

Sincerely,

Marc Paul M. Susa

Mrac Paul M. Susa

Ilima Intermediate School
91-884 Ft Weaver Road
Ewa Beach, Hi 96706

David J. Wellhouse
Federal Aviation Administration
Airport District Office
Box 50244
Honolulu, Hi 96850

Dear J. Wellhouse

What I think about this is that why are you tearing down the forest, the forest is where all of animals come from If you tear down the forest you tear down the animals. To me I think I should help save the rainforest. Maybe some scientist could study more about different animals.

Sincerely
Mark Tongadi

Kawika Thomas
Ilima Intermediate School
91-224 ft. Weaver Road
Ewa Beach, HI 96706
May 7, 1996

David S. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir,

Hi, my name is Kawika Thomas. I go to Ilima Intermediate school and I am in 7th grade. You are endangering the animals if you start to build a big air port on Maui. If you build more planes on Maui then a lot of people will start complaining because of all of the noise. That is the only rainforest park around here. You shouldn't build it so close because all of the animals have not that much choices in the world.

Sincerely,

Kawika Thomas

Ilima Intermediate School
91-824 Kapolei Road
Ewa Beach, Hawaii 96706
May 6, 1996

David J. Welhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI. 96850

Dear Mr. Welhouse:

Hello Mr. Welhouse my name is Celestina Tagovailoa, my friends call me Tina for short. I'm one of the students of Ilima Intermediate, I'm in 7th grade. The reason why I'm writing to you is because I don't think that you should expand the airport because if you expand it you are the lives and homes of those animals.

But on the other hand if you expand the airport their will be more planes and more tourists that means more money, but would you really want to expand a airport for more money and

us take half of the homes of the animals, would you like to be treated that way I question myself. Well I hope you actually read this letter good because it means a lot to me and other people cutting down trees taking homes is very hard when money's involved.

Thank you

Sincerely,

Celestina J. Tagovailoa

Celestina J. Tagovailoa

DOCUMENT CAPTURED AS RECEIVED

Maebel Tinoko
Ilima Intermediate School
91-844 ft. Weaver Road
Ewa Beach, HI 96706
May 6,1996

David J. Wellhouse
Federal Aviation Administration
Airports District office
Box 50244
Honolulu, HI 96850

Dear Sir:

My name is Maebel Tinoko; a student of Ilima Intermediate. This is to notify you of what I am really concerned about. I also would like to tell you my opinion of the park.

I am concerned about the expansion of the airport. I would like to know why are they planning to make the airport larger? The reason I am concerned is because I believe that if they do decide to make the airport larger, it will ruin a lot of the endangered species natural habitats that surround them. Plants are very important to our environment.

When I read the article, it was hard to believe that this National Park System has the most endangered animal species that live in any of The National Parks. I am glad that the park was built to protect these animals, and that's why I think that some animals from other countries or states should be forbidden to come near or in the park. The reason for that is, it might cause the other animals in the park to go crazy, it can be very dangerous and some animals might cause other animals to die.

I am also concerned about whether or not the airport has anything that detects illegal species to come to Hawaii. If not, why not? If airports don't detect illegal species, such as the brown tree snake, many of the animals could die. All airports in Hawaii should have police dogs that are trained to smell illegal things. In conclusion I hope a few changes do happen in your Environmental Impact Statement if the airport does get expanded.

Sincerely,

Maebel Tinoko

Nancy Tran
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, HI 96706
May 6, 1996

David J. Wellhouse
Federal Aviation Admission
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi, my name is Nancy. I am in the seventh grade at Ilima Intermediate School. The reason I am writing to you is that I have heard about some people bringing in illegal pets from other countries. I also heard that animals are dying because of these illegal pets. I would like you to hear some of my ideas to keep these endangered animals alive.

I think you should check every ones bag who comes off the plane and approve if its okay or not. If the bag has animals in them you should either mail it all back to where they came from or you keep them in a zoo.

Since many people from around the world do not know that it is against the law to bring animals from a different places to the island of Maui. Shouldn't they have been notified before entering the plane or when they are buying their tickets, they should be given a bunch of rules about smuggling animals to the islands.

Thanks for your time in reading my letter of concern. I really appreciate your work and all the hard work you've done to control animal smuggling into the islands. Thanks again and I appreciate your time.

Sincerely,

Nancy Tran

Ilima Intermidate School
91-889 Ft. Weaver Road
Ewa Beach, HI 96706
May 8, 1996

David J. Wallhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850

Dear Sir:

My name is Jennifer Uyehara. I'm 12 years old & I'm tired of people making excuses to make money & ignoring the cosequences of thier actions, So I'll be blunt...

Listen to me, Why don't you put that agricultural inspection on line? Maybe then less people won't bug you as much about the alien species problem. Remember, It *costs money* to *make money*, ok?

Yeah, I know that no matter what you do people will complain. Maybe less people will complain if you put the agricultural inspection on line. I'll be brief, Why do you

want to expand the airport besides to make money ? I just want 1 GOOD answer & then I'll go away.

Sincerely,
Jennifer Uyehara

Jennifer Uyehara

KALEKA VALDIS
ILIMA INTERMIDIATE SCHOOL
91-864 FORT WEAVER RD.
EWA BEACH, HI 96706
MAY 7, 1996

DAVID J. WELLHOUSE
FEDERAL AVIATION ADMINISTRATION
AIRPORT DISTRIC OFFICE
BOX 50244
HONOLULU HI 96850

DEAR: SIR

HI, MY NAME IS KALEKA VALDIS. I AM IN THE 4th GRADE. I AM FROM ILIMA INTERMIDIATE SCHOOL. I HAD DONE THE LETTER ABOUT THE SPECIES AND ALIENS AND EXPANDING THE KAHULUI MAUI AIRPORT. TO MY CONCERNING I FIGURE THAT THEY SHOULD NOT EXPAND THE KAHULUI AIRPORT BECAUSE OF ALL THE POLUTION AND ALL THE ROOM THAT THEY WILL HAVE WOULD BE LESS. ALSO I THINK THAT IF YOU WERE TO MAKE IT BIGGER IT WOULD BE PART OF GOOD BECAUSE YOU WOULD MAKE MORE MONEY TO. BUT THE MAJORADIE OF MY SIDE WOULD BE NO YOU SHOULDN'T EXTEND THE KAHULUI AIRPORT. ALSO ALL POLUTION WOULD KILL ALL ORGANIC THINGS IN LIFE ACTIVITIES. IF WE HAVE A LOT OF POLUTION ALL PEOPLE WILL END UP IN HOSPITALS. I DON'T THINK THAT PEOPLE FROM OTHER PLACES SHOULD BEING THINGS THAT WE ARE

NOT USE TO LIKE THESE ALIEN SPECIES THAT YOU WERE TALKING ABOUT IN THE ARTICAL ANY WAY! I HOPE YOU AGREE OF MY OPINION AND THANKS A LOT IF YOU DO. "PEACE"

Sencerly Yours
Kelly Vall

☮ ☺ = HAPPINESS FOR US PEOPLE.

Juliet Vallesteros
Hima Intermidate School
91-884 Ft. Weaver Road
Ewa Beach, HI. 96706

David j Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI. 96850

Dear Sir:
Hi! My name is Juliet Vallesteros. I just wanted to write to you concerning the expansion of the Airport.
I think that you shouldnot expand the airport because what is the sense of makeing the airport bigger if people or tourist only go there to get on the island or get off the island? If you want to expand the airport you should expand it another way instead of expanding it towards the park. If you tore down the park there will hardly be a tourist attraction, and then you will be expanding the airport for nothing cause people are not going to be coming on the island. If you distroy the park where the animals live then where will they goand what will the kids see when they go on a feild trip or how will they get to see all the different types of animals?
What you do now can affect people or other things in the future. So think

really carefully about this cause it is importent to everyone.

Sincerely,

Juliet Vallesteros

Juliet Vallesteros

Chelcy Villavicencio
Ilima Intermediate School
91-884 Ft. Weaver Rd.
Ewa Beach, HI 96706
May 9, 1996

David J. Wellhouse
Federal Ariation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear Sir:

Hi, my name is Chelcy Villavicencio, and I am 12 years old. I am concerned about the expansion of the Kahului Airport. I'm definitely against the idea of expanding the airport.

If the airport is expanded, sure there will be more room for the Alien species, but think about the damage it will do to other things. If you decide to go on with the plan of making the airport bigger, then some animals and creatures will have no home. People will have less views and room for enjoyment. If you think expanding the airport will pose no threat to the endangered species, then you need to think again. Even if you damage a little bit of the land it makes a difference.

Another problem you will face is what you should do about the fertile land and sugarcane. The land can be used for other things such as crops and farms. Fertile land should not have an airport on it; especially if there is not much fertile land on the face of this earth.

Hopefully you understand my point of view of what is happening. You will then see it is a mistake to make the airport bigger. I will be very glad and very much happy if you will please respond to my letter.

Sincerely,

Chelcy Villavicencio

Chelcy Villavicencio

Robert Von Oelhoffen
Ilima Intermediate school
91- Ft. Weaver Rd.
Ewa Beach, HI 96706
May 7, -1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

Dear. Mr. Wellhouse

I am a 7th grader in Ilima Intermediate school.
I am writing a this letter because Mr. David J. Wellhouse. He send this letter to use for our advice. You won't to build a bigger lane of for the airplain.

I disagree with you because what well happen to the animal, the palution can kill the animals
A can to you will have to cut some tree down. What well happen to the color system of the solar system gpio to have a bigger hole.

I agree with you because the people soull be safe that is a I got to say.

Sincerely,

Robert Von Oelhoffen

Robert Von Oelhoffen

Heather Watanabe
Ilima Intermediate School
91-889 Fr. Weaver Road
Ewa Beach, HI 96706
May 4, 1996

David J Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, HI 96850

DEAR SIR:

Hi! my name is Heather Watanabe, and I'm a student at Ilima Intermediate School. I am concerned about why we should make the airport larger. If you do expand the airport, it would ruin Maui's tropical Rainforest. As a suggestion, I think you should move the airport to another direction so it won't ruin anything.

I don't think you should remove airport inspection because, what if someone sneaks illegal objects into the airport or airplane. I think you shouldn't make it larger because its is big enough now. If you ruin the Rainforest, Where will all the animals live? What if there is a cure for a disease in that Rainforest? So I don't think you should make the airport larger.

Sincerely,
Heather Watanabe
Heather Watanabe

Ilima Intermediate
91-884 Ft Weaver Rd
Ewa Beach, Hi 96706
May 6 1996

David J Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Mr. Wellhouse

Hi! My name is Aldridge Watts. IT is a very pleasure to write to you. I do not support the Airport extending because a lot of kids might like the animals at the park. I dont think we should extend the Airport, not even an inch. It would be a good idea to extend the Airport somewhere else. This way people will have a better time at the park.

Please dont extend the Airport close to the park, Please?

Sincerily,
Aldridge Watts

Danielle Williams
Ilima Intermediate School
91-884 Ft. Weaver Road
Ewa Beach, Hi 96706
May 7, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hi 96850

Dear Sir:

I'm a 7th grade student that's concerned with the problems of expanding Maui's Kahului Airport. The expansion of this airport will expand in Haleakala National Park will destroy the park and the species that live in it. If we introduce species that aren't native to Maui / Hawaii that are harmful to our native plants

and animals they will all die out. The brown tree snake has wiped out most of the native bird species. Since people are the only things that hunt the brown tree snake, and some people aren't as successful as others, they expand their population. Some brown tree snakes make their way into other places by plane. If airports don't have things to check luggage harmful non-native things can come and destroy species that have been here for a very long time.

Since the FDA has failed to put inspection and quarantine in the airport there's more risk of having things that endanger humans and other living things. It will allow more things that aren't familiar to Hawaii to pass through.

The FDA and Hawaii Department of Transportation and FDA have excluded the national park Service from discussions so they can't express their opinion. Its absence from the discussion will give the FDA a benefit to get their way. Haleakala should have a say in whether their park will be demolished or will story the way it is.

Sincerely,

Danielle Williams

DANIELLE WILLIAMS

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
BRIAN K. MINAAI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
AIR-EN
97.1241

August 20, 1997

Ms. Angie Callahan
1996 Seventh Grade Science Class
Ilima Intermediate School
91-884 Fort Weaver Road
Ewa Beach, Hawaii 96706

Dear Students:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letters of May 1996 on the Draft EIS for the Kahului Airport Improvements. Your letters and concerns will be forwarded to the decision makers prior to the final decision on the expansion of Kahului Airport.

Contrary to some of your statements, the Federal Aviation Administration (FAA) will not profit from this expansion, and the major purposes for the airport improvement projects are to: (1) create an airport infrastructure which will support the present and future goals and objectives of the County and State; and (2) to continue to provide safe, efficient, economical, and convenient air transportation facilities for passenger and air cargo service to the residents of, and visitors to, the State and Maui through the Year 2010 in a manner which accommodates existing and forecast aviation demands. The Proposed Project will allow the airport to operate more efficiently and provide both residents and visitors a more pleasurable experience in keeping with the Aloha spirit of the islands. Kahului Airport currently has international and overseas flights arriving and departing from the airport.

In your letters, you have expressed concern on the destruction of Haleakala National Park and the rainforest. Please be assured that we will not be building the proposed airport projects on Haleakala National Park and will not be disturbing any of the rainforest to build the airport expansion project.

We, too, value the National Park Service's (NPS) expertise on ecosystem issues and Haleakala National Park. The NPS has been an active participant in the EIS process, has provided information for the preparation of the EIS, and has reviewed the Draft EIS. The FAA and State of Hawaii, Department of Transportation (HDOT), Airports Division, have used the information provided by the NPS in the preparation of the Draft EIS. In addition to their participation in and review of the Draft EIS, their expertise was sought in the development of the information included in the biological assessment on the alien species issue. The NPS is a member of the Biological Assessment Technical Panel and has provided scientific reference materials as well as direct experience in the area of alien species impacts and control. The EIS will discuss appropriate measures to inspect and control the introduction of alien species at Kahului Airport. (See attachment "mitigation measures")

In addition, the EIS did study the impacts of the airport improvements for air pollution, noise pollution, water pollution, and endangered species. It discuss the use of ferries and other transportation alternatives. The airport improvements will be funded by airport revenues and do not involve the use of tax revenues. The use of airport revenues is limited to airport purposes only.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

List of Students Commenting on the
Kahului Airport Improvements

Jennifer Abellanida
Christina Agapay
Jermaine Alcantara
Arlene Alejandro
Grace Alegre
Ginger Amaral
Lauren Aoki
Darcel Apostadiro
Adrian Balisacan
Yardley Batalona,Jr.
Rhea-Cherie Batangan
Carlos Bautista, Jr.
Lee Andrew Bohne
James Caballes
Jackie Cariaga
Leslie-Rose Carlos
Daneil Chong
Jessica R. Clay
Ann Marie Clary
Kani Colipano
Devinn Couch
Dustin Crouch
Gilbert Cruz
Christina M. Drawdy
Vincent Marvin A. Dulatre
Theresa Edrosolan
Ivy Epan
Mark Eslit
Jon Robert Evans, Jr.
Raymundo Galiza
Jennifer Gallegos
Rolando Gangcuangco
Gerona Garcia
Mark Gomez
Allison Goodman
Jerena Griffith
Amber Grzegorczyk
Aurie Justina Halmos
Jacqueline Hashimoto
Matthew Hernandez
Julie Holy
Mary Hoots
Janice Isidro
Seigfreid Itol
Jennifer Jimenez
Tehane Kekuawela
Chad Kim
Kristine A. Lacar
Rose Lawton
Kaeo A. Lealao
Eumirjohn Leano
Jane Lemau
Aaron-Patrick Leong
Justin M. Lewis
Rhiannon Lieces
Loreto Macadaeg, Jr.
Ronilo Maganis
Heather Malia
Leilani C. Marcella
Jensen Mata
Nicole McKeague
Lyra Mendoza
Mary Jane O. Menor
Abeni Millan
Jaclyn Molina
Ryan Mossman
Ayja Nakasone
Joycelyn P. Natividad
Noreen Olaguer
Cherina Ontai
Kharen Paguio
Tiffany Palmeira
Eleni Papakirstis
Andre Patrick
Bronson Paulo
Tanya Pender
Riezo Ann Perez
Diane Puahi
Kimberly Rabago
Luela Ramos
Mark Real
Rachael Rigsbee
Kapeka Robello
Thomas C. Roberts
Isabel Roberta Rodrigues
Micheal Sanchez
Christina Scott
Tiare Shigaki
Joslyn Silva
David Smith
Steve Soares, Jr.
Sunshine C. Spotts
Charline Stephens
Silvestre G. Suga
Gladis L. Sumbad
Lance Sunio
Marc Paul M. Susa
P. Tabugdi
Kawika Thomas
Selesitina Tagovailoa
Maebel Tinoko
Nancy Tran
Jennifer Uyehara
Kaleka Valdis
Juliet Vallesteros
Chelcy Villavicencio
Robert Von Oelhoffen
Heather Watanabe
Aldridge Watts
Dannielle Williams

MAY 2 0 '96

TOM CANNON, AIA

720 AWALAU ROAD, HA'IKU, MAUI HAWAII

16 May 1996

Federal Aviation Administration
Honolulu Airports Division Office
Attention: David J. Welhouse
Box 50244
Honolulu, HI 96850

Subject: **Environmental Impacts of the proposed Kahului Airport expansion, and the recent draft Environmental Impact Statement**

Dear Sir:

I am an Architect, who was born and raised on Maui. Although I am a child of this land, I didn't fully realize how globally unique the Hawaiian islands are until later in my life, after being educated and traveling to other parts of the world. Now I know more fully how special my home island is, and how we will loose the qualities of Maui without better care. The EIS process, for projects such as the proposed Airport expansion, is supposed to insure proper care. Unfortunately this draft doesn't even come close, and if it is accepted without significant improvement, we stand to quickly loose Maui's finest characteristics forever. What will we pass on to the next generations?

The most unique and special attribute of Hawai'i and Maui, which truly sets us apart from the rest of the world, is our native Hawaiian plant and animal species. They were here long before we humans, and over hundreds of thousands of years evolved into an exceptionally gentle environment. This native Hawaiian environment (or *'aina*) is Hawai'i's heritage ... and the best asset we have to ensure long-term economic benefit for ourselves, and future generations. Hawaiian species have a high potential to benefit humanity by providing medicine and a unique gene pool to modify other species. Hawaiian cotton has already been used to genetically alter American cotton, making it more resistant to disease. The Hawaiian plant *olona* provides an exceptionally strong natural fiber for rope. The potential to benefit humanity and the economic potential of Hawaiian native species has barely been tapped; and yet many species are being lost to extinction ... without ever being placed on an endangered species list. By far the most serious threat to this, Hawai'i's most precious asset, is the introduction of aggressive non-Hawaiian species.

See Comment TC-1

When Hawaii was a U.S. Territory (instead of a State), no one was allowed to come here from the mainland U.S. or internationally without first having his baggage inspected and being interviewed regarding transported organic materials. This is still done in every major Pacific island nation. In every one (without exception) this inspection process is considered a basic level of precaution. Now, in Hawai'i, we rely on an "honor system" .... If you're sneaking your pet Boa Constrictor or Jackson Chameleon into Hawai'i ... you are expected to turn yourself in at the airport upon arrival .... This method, does not work.

We read about Piranha found in a reservoir on O'ahu, about the Iguana found in I'ao Stream, about the Miconia we must now work to eradicate in Hana, and the many pest species turned in to the State on "amnesty day" each year; yet here we have a proposal which will increase the potential for more pest introductions and we are told that no mitigation is necessary. The fact that the present Draft EIS does not adequately evaluate this potentially disastrous risk, renders it highly inadequate.

Most of Hawai'i's remaining native species are on the neighbor islands. We should not allow for more direct flights from outside Hawai'i to Maui until we have a proven defense system against the invasion of aggressive non-native plant and animal species, and new plant and animal diseases. We certainly don't have that now. Considering the global uniqueness of Maui's native environment, we should have a world class defense system in place and tested (at least as good as New Zealand's), prior to this airport expansion.

The previous draft EIS for this proposed Airport expansion noted that between 50 and 75% of all unwanted foreign species arrive in Hawai'i via airplanes, ... and that these pests would be even more likely to arrive via airplanes to Maui (as opposed to O'ahu), in that our airport is surrounded by vegetation, rather than asphalt. This new draft EIS (which seems to substitute a quantity of pages for adequate analysis) was supposed to improve upon the previous study, yet it doesn't even acknowledge these facts. Rather it seeks to ignore the issue by saying these pests will get here with or without the Proposed Project, and on this unfounded premise concludes there are no significant Project impacts and no mitigation necessary. This simply is not true. This proposal will both increase the number of departure locations accessible to Maui, and the potential for additional flights. Just because these increases may have been left out of the State forecast, does not mean they are unlikely to occur in the future. It seems unconscionable for a State sponsored EIS to use the excuse that the State's alien species prevention mechanism is flawed, to rationalize that this Airport expansion proposal will have no additional impact. And it is just not true. Yes, the situation is bad now, but it can (and would) get worse. .

Please, look at what's at stake here. Maui's one-of-a-kind native species, and the Hawaiian culture associated with them, depend upon adequate care. What is at stake is too important and critical to Hawai'i's future to risk, when we do not have even basic precautions in place. What is at risk is an essential component of what makes Hawai'i, Hawai'i; and Maui, Maui, ... one of the world's most special places.

Humans depend upon plants and other animals to exist on this earth; we need each other. We cannot continue to loose our global diversity. To continue on this path is to leave future generations with out hope. We are not risking "just a few" species here. Hawai'i has more than one third of the endangered species in the entire United States; and Hawaiian species depend upon each other. Loosing one could mean losing the entire group that depends upon that one.

We must forego short-term profit when the risk is too great, and make certain that we protect our resources, so that they will benefit us for the long-term. We need to be protecting Maui's and Hawai'i's natives like they are the most fragile, precious resources in our care; because they are. Will future generations look back on this day in Maui's history as the final turning point in the struggle between cultural biological diversity and human short-term self-interest? ... the beginning of the end? Our action, or lack of action to ensure the continued existence of Maui's natives, will determine how well our generation has cared for the land (*ka 'aina*), our only home, and our kid's best chance at a positive future.

Please consider this a formal request to be a consulting party for further preparation of the Environmental Impact Statement.

Sincerely,

Tom Cannon, AIA

TRC/klp

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.944

August 20, 1997

Mr. Tom Cannon
720 Awalau Road
Haiku, Hawaii 96708

Dear Mr. Cannon:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 16, 1996 on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT TC-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and

candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its

analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS.

Lastly, with regard to the alien species issue, the mitigation measures being proposed include planning and designing a new air cargo facility in consultation with the State and the U.S. Departments of Agriculture, as well as funding for a new state agriculture inspector. These measures, which will only be possible as part of the Proposed Project, will allow both agencies to perform their duties more efficiently and effectively for the betterment of all of us. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

MAY 0

351 Anonia Street
Honolulu, Hawaii 96821
May 6, 1996

David J. Wellhouse
Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850

Dear Mr. Wellhouse:

I am opposed to the expansion of Maui's existing airport because it poses a high risk of irreversible damage to Haleakala National Park. See Comment EC-1

Haleakala is recognized as an International Biosphere Reserve; it holds more endangered species than any other site in the National Park System. See Comment EC-2

There is such a high risk that international flights to Maui could bring unwanted and dangerous foreign species to the island and damage or destroy our existing endangered species. If that occurs, we will never be able to reverse that loss. See Comment EC-3 and EC-4

The EIS that has been conducted raises many questions which have not been satisfactorily answered. It seems to me that it is premature and negligent to proceed with the current lack of information.

Sincerely,

Evelyn Char

Evelyn Char, RN, MS

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1023

August 20, 1997

Ms. Evelyn Char
351 Anonia Street
Honolulu, Hawaii 96821-2052

Dear Ms. Char:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AH1011-07

Thank you for your comment letter of May 6, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT EC-1 - Impact of Proposed Project on Haleakala National Park

The purpose of the Proposed Project is described in Section 2 of the Draft EIS. As indicated, the Proposed Project is in response to existing and forecast increases in aviation demand at Kahului Airport. These increases will occur with or without the Proposed Project. The Proposed Project is expected to have a minimal effect on Haleakala National Park.

COMMENT EC-2 - Endangered Species

The potential impact of the Proposed Project on listed and candidate species (endangered and threatened species) is discussed in Sections 3.11.1 and 3.11.2 of the Draft EIS. As indicated in the Draft EIS, there will be no effect on listed or candidate species of plants. Similarly, there will be an insignificant effect on listed or candidate species of wildlife.

COMMENT EC-3 - International Flights

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following

information will be added to the discussion in Section 8.2.1. International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT EC-4 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the

formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended

that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

ABHI

A&B-HAWAII, INC.

May 28, 1996

Federal Aviation Administration
Airports District Office
Box 50244
Honolulu, Hawaii 96850-0001

Attention: Mr. David J. Welhouse

Re: March 1996 Draft Environmental Impact Statement (DEIS) for Kahului Airport Improvements

Gentlemen:

A&B-Hawaii, Inc. (ABHI) offers the following comments on the DEIS:

1. The DEIS states that "The total amount of lost farmland will increase to 700 acres if the parallel runway . . . is constructed" (p. 3-114).

The total amount of farmland ABHI will lose from all of the Kahului Airport improvements will be approximately 775 acres (2% of ABHI's cultivated acres on Maui), calculated as follows: See Comment ABHI-1

(a) As noted in the DEIS, 139 acres will be lost due to land acquired, or to be acquired, by the State for the runway extension and airport access road.

(b) 29 acres located in the area mauka of the K-Mart Store on Dairy Road, on the northern side of Hana Highway, also will be lost. These acres comprise a remnant parcel that will be created by the construction of the airport access road and which will no longer be feasible to farm after the road is constructed.

(c) As noted in the DEIS, 488 acres will be lost due to land acquired by the State for the parallel runway.

(d) An additional 119 acres located makai of Hana Highway which ABHI currently leases from the State also will be lost when the parallel runway is constructed.

2. With appropriate mitigation, the loss of 168 acres resulting from the extension of the runway and construction of the airport access road will not have a materially adverse impact on ABHI's farming operations. Due to the parallel runway's distant time horizon for construction, and the changes that inevitably will occur in the interim to agriculture's regulatory and economic environment, it is not possible to evaluate the impact of removing an additional 607 acres from agriculture at this time. We therefore reserve the right to comment on the impact the removal of additional farmland will have on ABHI, until such time as a Draft Environmental Impact Statement for the parallel runway is prepared. See Comment ABHI-2

3. ABHI desires to farm the land contemplated for the parallel runway for as long as the land is not required for the actual construction of the runway. We therefore request your support in not removing the land from farming operations until actual construction of the runway commences. See Comment ABHI-3

4. The DEIS states that ABHI "has plans to convert approximately 340 acres of its land near the Airport from agriculture (sugar) to industrial and other urban uses" (p. 3-25).

ABHI's previous plans contemplated the urbanization of 340 acres near the Airport. These 340 acres, however, included most of the land the State later acquired for the runway extension and airport access road. ABHI's current plans contemplate the long-term urbanization of approximately 240 acres (exclusive of State-owned lands). See Comment ABHI-4

5. The DEIS states that "given the lack of available water supplies for irrigation purposes, the removal of the 550 acres of sugar cane lands for the parallel runway will ease pressures for limited water supplies" (p. 3-114).

This statement is not correct as to the referenced 550 acres. These acres are or shortly will be irrigated with mill water, and do not rely on surface water for irrigation. Therefore, their removal from agricultural production will not ease any pressures for limited water supplies. See Comment ABHI-5

6. According to the Air Quality Study prepared by B. D. Neal & Associates, the emission statistics in Table 3-22 were "based on source information on file at the Department of Health, U. S. Environmental Protection Agency emission factors, and statistics given in the State of Hawaii Data Book 1992" (Appendix See Comment ABHI-6

F, p. 19). So that we may have an opportunity to evaluate your emission numbers, we would greatly appreciate it if you would advise us of the exact methodology, data and other information B. D. Neal & Associates used to calculate the Agricultural Field Burning emissions identified in Table 3-22. End of ABHI-6

Thank you for the opportunity to comment on the DEIS. Please do not hesitate to contact the undersigned if you should have any questions.

Very truly yours,

Meredith J. Ching
Vice President

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.965

August 20, 1997

Ms. Meredith J. Ching
Vice President
A&B Hawaii, Inc.
P. O. Box 3440
Honolulu, Hawaii 96801

Dear Ms. Ching:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 28, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT ABHI-1 - Loss of Farmland

The Final EIS will be corrected to indicate that a total of 775 acres of A&B farm land will be required for the Proposed Project.

COMMENT ABHI-2 - Future Loss of Farmland

We agree that it is not possible to evaluate the impact of removing another 607 acres of farmland that will be required for the proposed parallel runway. As indicated in the Draft EIS, the proposed parallel runway will be the subject of future environmental documentation once the project is better defined.

COMMENT ABHI-3 - Use of Land for Farming Operations

No land will be removed from farming or other uses until it is required for airport purposes.

COMMENT ABHI-4 - Conversion of Farmland to Urban Uses

The Final EIS will be corrected to indicate A&B's current plans to contemplate the long-term urbanization of approximately 240 acres, exclusive of State-owned lands. (See attachment "farmland")

COMMENT ABHI-5 - Source of Irrigation Water

The Final EIS will be corrected with respect to the source of irrigation water for the 550 acres of sugarcane lands and the effects on limited water supplies. (See attachment "farmland")

COMMENT ABHI-6 - Air Quality

The methodology, data and other information used to calculate the Agricultural Field Burning emissions identified in Table 3-22 is provided in the attached letter.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

B. D. NEAL & ASSOCIATES
Applied Meteorology • Air Quality • Computer Science

August 21, 1996

Mr. Brian T. Ishii
Edward K. Noda and Associates, Inc.
615 Piikoi Street
Honolulu, Hawaii 96814

RECEIVED
NOV 20 1996
EDWARD K. NODA & ASSOCIATES

Subject: Kahului Airport EIS
Air Quality Study
Agricultural Field Burning Emission Estimates

Dear Brian:

Per your request, herewith is a discussion of the basis for the agricultural field burning emission estimates included in Table 5 of the Air Quality Study for the Proposed Kahului Airport Improvements which we prepared last year.

Emission estimates were prepared by first estimating the 1992 acreages of sugarcane and pineapple on Maui. Then, fuel loading (waste production) factors were estimated and U.S. EPA emission factors were applied. The U.S. EPA emission factors were obtained from Table 2.4-5 of the "Compilation of Air Pollutant Emission Factors", Volume I (including supplements A-F), AP-42, July 1993 (hereafter referred to as AP-42).

Sugarcane

Based on the 1992 Hawaii Data Book, it was estimated that about 40,000 acres on Maui were in sugar cane during 1992. Since sugar cane is a two-year crop, approximately 20,000 acres would thus have been harvested during 1992. Table 2.4-5 of AP-42 suggests that the fuel loading factor for sugarcane burning ranges from 3 to 17 tons per acre. Based on work done in Hawaii during the 1970's (Hawaii Sugar Technologists Report, 1970), it was determined that the fuel loading factor for burning sugar cane in Hawaii was about 21 tons per acre. Thus, the upper limit of the range given by EPA (17 tons per acre) was assumed.

Table 2.4-5 of AP-42 gives ranges of emission factors for particulate, carbon monoxide and hydrocarbons. In calculating the emissions, the upper limit of the range for each parameter was assumed. Emissions were thus calculated as follows:

P.O. BOX 6239, OCEAN VIEW, HAWAII 96737-6239 • TELEPHONE (808) 939-0317 • FAX (808) 939-7390

Particulate:

$$\frac{(20{,}000\ acres/yr)(17\ tons\ waste/acre)(8.4\ lb/ton)}{2000\ lb/ton} = 1{,}428\ tons/yr$$

Carbon Monoxide:

$$\frac{(20{,}000\ acres/yr)(17\ tons\ waste/acre)(81\ lb/ton)}{2000\ lb/ton} = 13{,}770\ tons/yr$$

Hydrocarbons (Methane + Nonmethane):

$$\frac{(20{,}000\ acres/yr)(17\ tons\ waste/acre)(15.8\ lb/ton)}{2000\ lb/ton} = 2{,}686\ tons/yr$$

Pineapple

Based on the Atlas of Hawaii (Second Edition, 1983), it was estimated that about 15,000 acres on Maui were in pineapple during 1992. Since pineapple is a two-year crop, approximately 7,500 acres would thus have been harvested during 1992. Table 2.4-5 of AP-42 does not provide any information pertaining to fuel loading factors for pineapple burning. Based on work done in Hawaii during the 1970's (Hawaii Department of Agriculture Report to the State Legislature on House Bill 219, February 1972), it was estimated that the fuel loading factor for burning pineapple in Hawaii is about 40 tons per acre.

Table 2.4-5 of AP-42 gives emission factors for particulate, carbon monoxide and hydrocarbons based on fuel loading and acreage. Emissions were thus calculated as follows:

Particulate:

$$\frac{(7{,}500\ acres/yr)(40\ tons\ waste/acre)(8\ lb/ton)}{2000\ lb/ton} = 1{,}200\ tons/yr$$

Carbon Monoxide:

$$\frac{(7{,}500\ acres/yr)(40\ tons\ waste/acre)(112\ lb/ton)}{2000\ lb/ton} = 16{,}800\ tons/yr$$

Hydrocarbons (Methane + Nonmethane):

$$\frac{(7{,}500\ acres/yr)(40\ tons\ waste/acre)(8\ lb/ton)}{2000\ lb/ton} = 1{,}200\ tons/yr$$

The sums of the emission estimates given above for sugar cane and for pineapple were reported in Table 5 of our study. In all likelihood, these emission estimates are conservatively high.

Please call me if you would like to discuss this matter further.

Very truly yours,

Barry D. Neal

Barry D. Neal
Certified Consulting
Meteorologist

1211

5/1/96

Mr. Owen Miyamoto,

I think it is quite essential that the Dept. of Transportation give great consideration to the wildlife protection issues when considering the idea of expanding the Maui airport.

See Comment JEC-1

It's the beauty of the land and the joy of it. People love the attract the tourists to Maui without the beauty of the land and the acceptance of the people, there will be no tourists and therefore no need for an airport at all.

See Comment JEC-2

Please, please reconsider the expansion issue.

Concerned citizen
Joyce Chong

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1024

August 20, 1997

Ms. Joyce E. Chong
94-165 Kuahelani Avenue, Apt. 17
Mililani, Hawaii 96789

Dear Ms. Chong:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 1, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT JEC-1 - Consideration of Wildlife

The flora and fauna of the airport area are discussed in detail in Section 3.11 of the Draft EIS. As indicated, the Proposed Project is expected to have little, if any, impact on either the flora or fauna of the airport area.

COMMENT JEC-2 - Purpose of Proposed Project

The purpose of the Proposed Project is described in Section 2 of the Draft EIS. As indicated, the Proposed Project is in response to existing and forecast aviation demands at Kahului Airport. The forecast increases in both aircraft operations and passenger levels are expected to occur with or without the Proposed Project.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

106

Ms. Lauri Christine
2781 Puuhoolai St.
Kihei, HI 96753-8577

1515

To: Owen Miyamoto, Admin.
400 Rodgers Blvd
Suite 700
Honolulu HI 96819-1880
5/16/96

Mr. Owen Miyamoto —
I am opposed to the lengthening of the runway at Kahului Airport on Maui

Sincerely,
Lauri Christine

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1025

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

August 20, 1997

Ms. Lauri Christine
2781 Puuhoolai Street
Kihei, Hawaii 96753-8577

Dear Ms. Christine:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comments on the Draft EIS for the proposed Kahului Airport Improvements. Your comment in your letter of May 16, 1996 regarding opposition to the Proposed Project has been noted and taken into consideration in the preparation of the Final EIS. Your letter and this response will be appended to the Final EIS for review by the decision makers.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

Dear,

My name is Brianna. I am a ninth grader at King Kekaulike High School on Maui. I am writing to ask you to please not build an international airport on Maui. The reason I am asking you this is that if you do build one it could introduce all kinds of new animal species to Maui and we have so many beautiful native plants and animals here that could easily be harmed by the introduction of foreign species. I think that many people don't realize what a special place Hawaii is, it seems like all anyone ever cares about any more is making money. Even though an international airport would create some new jobs, I think that in the long run we would benefit more from saving our native species.

See Comment BC-1

See Comment BC-2

Sincerely,

Brianna Corbett
321 Kulike Rd.
Haiku, Hawaii
96708

Joan Conway
Dept of Health
Wailuku Hi

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.717

August 20, 1997

Ms. Brianna Corbett
321 Kulike Road
Haiku, Hawaii 96708

Dear Ms. Corbett:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comments on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your letter. Your letter is attached for reference.

COMMENT BC-1 - Internationalization of Kahului Airport

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point, JAL

has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA) Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT BC-2 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent, there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the

biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

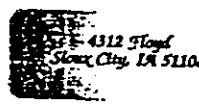
KAZU HAYASHIDA
Director of Transportation

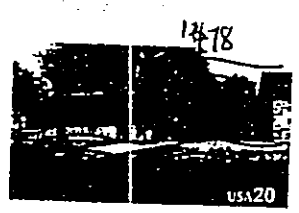
Attachment: As noted above

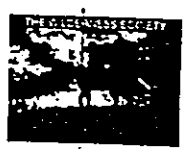
c: Federal Aviation Administration (D. Welhouse)

The EIS inadequately addresses the risk of introducing non-native species into the Hakakaia National Park. It is also failing to establish inspection and quarantine procedures for the airport. Don't let Hawaii become another Guam. — See Comment TC-1 — See Comment TC-2

T. Countermar







Owen Miyamoto
Dept. of Transportation, Airports
Honolulu International Airport
400 Rodgers Blvd #702
Honolulu HI 96819

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1026

August 20, 1997

T. Countermar
4312 Floyd
Sioux City, Iowa 51108

Dear T. Countermar:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 11, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT TC-1 - Introduction of Alien Species

The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the Hawaii Department of Transportation (HDOT). An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the Federal Aviation Administration (FAA) and the HDOT initiated early and informal consultation with the FWS regarding

the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is available regarding the introduction of alien species, including

information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT TC-2 - Inspection and Quarantine Facilities

Inspection and quarantine procedures at Kahului Airport are discussed in Section 3.11.3.4 of the Draft EIS. As indicated, the HDOT, Airports Division, is committed to continuing to work with the Hawaii Department of Agriculture (HDOA) and the U.S. Department of Agriculture (USDA) to deter the introduction of alien species through the State airport system. Additionally, HDOTA is committed to incorporating into the new air cargo building to be constructed at Kahului Airport the facilities and equipment recommended by HDOA and USDA that are necessary to deter the introduction of alien species into Maui. This action is one of the mitigation measures developed during the preparation of the Alien Species Biological Assessment as noted in the response to Comment TC-1, above.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

American Pacific Air, Inc.
P.O. Box 1505, Kahului, Maui, Hawaii 96732 • Tel. (808) 871-8115
Kahului • Kailua - Kona

Mr. David Welhouse,
U.S. Department of Transportation,
Federal Aviation Administration,
Honolulu Airports District Office,
Box 50244,
Honolulu,
HAWAII 96850-0001.

May 22, 1996.

Dear Mr. Welhouse,

I was unable to attend the Public Hearing on the EIS, Kahului Airports Improvements held at Kahului earlier this month, but wish to submit the following written comments on that study and ask that they be given consideration during further deliberations on the subject of expansion at Kahului.

Specifically, comments made in the draft EIS, Appendix R are addressed.

Page 9-15 under 'Previous FAA airspace studies of reactivating the former Puunene Airport states, interalia that three previous studies conducted by the FAA in 1988, 1989 and 1991 respectively rejected Puunene Airport for GA fixed wing aircraft.

Those of us familiar with these studies are well aware of the reasons for the rejection. The local FAA Office referred the request to Rabideaux, at that time Tower Chief at Kahului Airport. In a one page letter, which I have read, Rabideaux rejected the idea completely and in support of his position made several erroneous statements including the comment that Puunene Airport lies underneath the approach path to Rwy 02 at Kahului. It does not. He was then supported by the Airspace Division in Honolulu and from the letters, of which I have copies, including inter office memos of meetings held in Honolulu, it looks like a meeting of the 'good old boys' determined to squash and idea of reactivating Puunene for GA activity. One letter from an Air Force Colonel even suggested that flying activity at Puunene would upset his Star Wars program.

See Comment LDC-1

When Rabideaux was transferred, his position as Tower Chief at Kahului was taken by Green who simply echoed what his old friend Rabideaux had said. Green has now accepted retirement from the FAA.

I was so incensed by these machinations and the ramifications it was bound to have on GA activity leading into the year 2000, I wrote to David Hinson, FAA Administrator in Washington and also wrote to 'Bud' Riebel, Head of the Airspace Division, Western Region, LA, which includes the Airspace in Hawaii. Bud visited Kahului and we had a lengthy discussion on the subject. It would appear that the previous requests from Miyamoto for a study to be made of Puunene for GA operations, should have been made to the Airspace Division, Western Region.

Last year Bud's second in command, also from the Western Region, arrived here at Kahului. I met with him and after our 45 minute discussion I was most impressed with his knowledge and professional approach. Here was a man who knows what he is talking about and I can only reflect on the outcome had he been involved in the previous studies.

His evaluation resulted in the letter dated August 25, 1995, giving FAA approval for the use of Puunene Airport for GA fixed wing aircraft and helicopters subject to certain conditions being met.

Reference is now made to Meteorological Impacts page 9-16, refers.

Here we go again in what appears to be more unsubstantiated comments from 'pilots familiar with winds in the Puunene area etc..' and another attempt to find a reason to block using the airfield for GA fixed wing operations. The failure to get the FAA to reject the idea failed so let's think of something else, is the way it reads to people who know what they are talking about. The pilots who fly airplanes. The airspace users and the ones best able to judge whether or not the conditions are acceptable.

I have landed at Puunene Airport on a number of occasions in the usual tradewind conditions and without any concern. No different to landing at Kahului. In fact when a study was done for the Maui County, wind annemometers, which had been erected by Maui Electric, one immediately adjacent to the Puunene Airport, to check wind directions for their proposed wind-powered generators, winds throughout a one year period showed a very consistent 030-040 degree consistent direction and wind strengths in the same magnitude as those at Kahului Airport. Winds tend to maintain a more constant direction due to the aligning effect from the West Maui mountains. At Kahului winds frequently shift to a more Easterly direction and 050-060 are not unusual. The readings from the annemometers are available.

The comment made in your study that a crop duster operator considered Puunene unsuitable for student pilots I assume came from Bob Stuart, the 70 year old pilot who flys the crop duster. Bob is a personal friend and has not been a Flight Instructor for over 20 years and his Flight Instructor experience was very limited.

It is true that during the WW11 activity as a Naval Station, there were a number of accidents. This is not surprising and many of these were directly related to the experience

of the Navy pilots using the airfield. Many of the pilots were low time pilots flying highly sophisticated fighter aircraft and engaged in practicing low speed carrier deck landings.

I learned to fly during WW11 and after graduation and with barely 200 hours flying experience was assigned to a Fighter Sqdn. I was given the handbook for a single seat P51 Mustang fighter, told to read it, go and fly it, try not to crash it but if I did, come back and they would give me another one. I crashed two aircraft, one a single seat jet fighter. That was a wartime scenario and bears no relationship to the training a young student pilot gets today.

We have trained hundreds of student pilots at Kahului during the past 10 years and during that time and after approx. 30,000 hours we have never scratched an aircraft. We have student pilots with a total of 25 hours experience carrying out take-offs and landings at Kahului Airport in winds gusting to over 30 kts. They are trained to handle the conditions and there is no reason to suggest that it would be any different if we flew at Puunene.

Puunene is the obvious choice for GA activity and helicopters. Any suggestion of a parallel runway at Kahului is nothing short of a further waste of time and taxpayers' money. It has taken years of litigation just to get the present Kahului Airport Rwy 02 extended and it takes little imagination to realize how many years the DOT would be tied up in litigation if a parallel runway was decided upon.

In the meantime Air Carrier operations will continue to increase, already above projections made three years ago and will reach a point where GA activity will be forced out or lengthy, unacceptable delays will result. Bear in mind that under the FAA Charter, they are required to provide equal access to all aircraft, be it 747 or Cessna 150. Air Carrier operations will increase but airlines will re-equip with larger aircraft as time progresses. Airline economics dictate that when a certain frequency of operation is reached, airlines operate larger capacity aircraft. If GA activity was moved to Puunene, this would extend the present useful life of Kahului Airport and Rwy 02 well into the next century and there will be no need for a parallel runway.

Cost of a parallel runway at Kahului v/s moving GA activity is just another factor. The comparison in costs is like night is to day.

We have all witnessed millions in taxpayer dollars spent on consultants fees. Let us see the DOT make the obvious and least costly decision and get on with it.

Sincerely,

Len D. Cowper

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1027

August 20, 1997

Mr. Len D. Cowper
American Pacific Air, Inc.
P. O. Box 1505
Kahului, Hawaii 96732

Dear Mr. Cowper:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 22, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT LDC-1 - Relocation of General Aviation Facilities

The relocation of general aviation facilities to an off-airport site is discussed in Section 4.4.3 of the Draft EIS. The Puunene site, the site of the "Old Maui Airport," was one of the alternative sites investigated. As indicated in the Draft EIS, based on the investigations performed, no portion of the original airfield pavement would be suitable for fixed-wing aircraft operations, including small, general aviation aircraft, on a regular basis. Also, the time and costs of constructing new facilities and/or rehabilitating the existing deteriorated facilities would be prohibitive. Further, the airspace conflicts between Kahului Airport and Puunene are significant but would be allowed by the Federal Aviation Administration if a new air traffic control tower was constructed.

As indicated in Section 2 of the Draft EIS, the purpose of the Proposed Project, that is, expansion and upgrading of Kahului Airport, is to accommodate existing and forecast aircraft and

passenger levels at the airport. The analyses performed to determine the extent of improvements required have taken into consideration general aviation activities.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

1381

5/3/96

Owen Miyamoto
Dept. of Transportation, Airports
Honolulu International Airport
400 Rodgers Blvd. #700
Honolulu, HI 96819

Dear Mr. Miyamoto:

I am writing you concerning the proposed airport expansion of international flights on the island of Maui and the impact that it will have on the endangered species that live in Haleakala National Park. See Comment AC-1

We all try so desperately on the outer islands to preserve Hawaii and prevent it from getting so terribly built up and enundated such as it is on Oahu. Don't you think it is sufficient to have only one international airport in Hawaii such as is on Oahu and that people should be able to take interisland flights from Oahu to reach other islands? The idea that people will be bringing in invading species that will not be confiscated by the quarantine authorities makes sense to me, so why take the chance of creating a biological catastrophe in the national park , as well as why infiltrate the island of Maui anymore than it already has been for the sake of tourism? Why is it so hard for Hawaii to come up with alternate forms of economy other than tourism when we live in such a unique environment?

Please reconsider having international flights land on Maui for the sake of our people, animals and environment. The decisions that are being made on our poor, abused planet are crucial for the future of the world and our islands. Help keep Hawaii as Hawaii, and preserve the ecosystem and native environment... See Comment AC-2, AC-3, and AC-4

Sincerely,

Andrea Cronrod

Andrea Cronrod
P.O. Box 646
Hanapepe, HI. 96716
resident 25 years

cc:David J. Wellhouse

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
Brian K. Minaai

IN REPLY REFER TO
AIR-EN
97.1028

August 20, 1997

Ms. Andrea Cronrod
P. O. Box 646
Hanapepe, Hawaii 96716

Dear Ms. Cronrod:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comment letter of May 3, 1996, on the Draft EIS for the proposed Kahului Airport Improvements. This letter is in response to your comments, which are attached for reference.

COMMENT AC-1 - Impact of Proposed Project on Endangered Species

The issue of the potential impacts of the Proposed Project on endangered species is discussed in Sections 3.11.1.1 and 3.11.2.2 of the Draft EIS. As indicated in the Draft EIS, there are no listed or candidate species of plants within Kahului Airport boundaries. Similarly, the Proposed Project is not expected to have any impact on listed or candidate species of birds within the airport boundaries.

COMMENT AC-2 - International Flights

The issue of International Flight Operations is discussed in Section 8.2 of the Draft EIS. In addition, the following information will be added to the discussion in Section 8.2.1.

International service is different from domestic service in that airlines must receive government approval, through the U.S. State Department and U.S. Department of Transportation, to fly a given international route before the flights can begin. International air service routes are generally negotiated between the U.S. and foreign governments, they may sometimes be provided on the basis of comity and reciprocity in the absence of an agreement, and

some foreign air carrier operations to U.S. airports may be authorized by exemption under the so-called Cities Program in limited situations. The terms of any bilateral agreements vary greatly from country to country, and new agreements are negotiated with countries on an ongoing basis.

Current bilateral agreements between the United States and Japan allow Japan Airlines (JAL) to provide one-stop service from Tokyo to Kahului with a stopover in Honolulu. Up to this point in time, JAL has elected not to fly to Kahului, choosing instead to terminate its flights at Honolulu and switching Maui-bound passengers onto Hawaiian Airline's interisland flights. Recently, however, JAL has expressed its intention to access its right to make one-stop, direct flights to Kahului Airport. This could be performed without lengthening the runway or increasing the pavement strength at the airport. However, interim international arrival facilities may have to be installed. The decision to initiate one-stop service to Maui is a business decision that is made by JAL and is beyond the control of the Hawaii Department of Transportation (HDOT) and the Federal Aviation Administration (FAA). Furthermore, the one-stop flights from Japan proposed by JAL can and would occur regardless of the Proposed Project. Lastly, as you may be aware, international flights from Canada are already occurring at Kahului Airport and have been for four (4) years. (See attachment "international flights")

COMMENT AC-3 - Impact on Haleakala National Park

The potential impact of the proposed project on Haleakala National Park is primarily related to the potential introduction of new alien species into Maui. The alien species issue is summarized in Sections 3.11.3.1, 5.1.5.1 and 8.2.5.10 of the Draft EIS. The discussion includes the recommendations from the Alien Species Action Plan (ASAP) Project. The ASAP is included in Appendix Q of the Draft EIS. The ASAP Project was made up of at least 20 state, federal and private organizations, including the FAA, The Nature Conservancy of Hawaii, Department of Agriculture, Department of Interior National Park Service (NPS), Department of Interior Fish and Wildlife Service (FWS), and the HDOT. An outcome of the ASAP Project was the formation of the Coordinating Group on Alien Pest Species (CGAPS), of which the HDOT is a member. Other members include the NPS, FWS, The Nature Conservancy of Hawaii, State and Federal Departments of Agriculture, Department of Land and Natural Resources, U.S. Postal Service, Hawaii Department of Health, U.S. Customs Service, U.S. Navy, Hawaii Farm Bureau, and the Hawaii Visitors Bureau.

In 1995, the FAA and the HDOT initiated early and informal consultation with the FWS regarding the potential impacts of the Proposed Project on the listed and candidate species and designated and proposed critical habitat. This consultation was to determine whether any such species or habitat were likely to be adversely affected by the Proposed Project. During this informal consultation, the FWS indicated that it would need to review the analysis provided in the Draft EIS in order to determine whether additional consultation would be required.

On March 1996, FAA and HDOT issued the Draft EIS for the Proposed Project. The analysis performed in conjunction with the Draft EIS concluded that the Proposed Project does not induce growth. In addition, the Draft EIS concluded that the future expansion of domestic or international service could occur with or without the Proposed Project and is beyond the control of the FAA and HDOT. Therefore, to the extent there may be an increase in the introduction rate of alien species to Maui in the future, the increase will not necessarily be a direct result of the Proposed Project. Rather, it will be a result of many factors which contribute to an airline's decision to provide service to an area including, but not limited to the following: availability of hotel accommodations; general economic conditions; and the marketing scenarios. These conclusions on the growth impacts are discussed in Section 6.0 and Appendix E of the Draft EIS. In addition, the issue of growth impacts related to alien species is discussed in Section 3.11.3.1 of the Draft EIS. The analysis in the Draft EIS concluded that there is an existing problem on Maui as well as in the rest of the State regarding the introduction of alien species. Because the Proposed Project may impact the introduction rate of alien species, the Draft EIS determined that the introduction of alien species is a potentially significant cumulative impact.

The FWS submitted written comments in response to the Draft EIS. The key issue of concern identified by the FWS was how the Proposed Project may increase the introduction rate of alien species to the airport environs and the impact this introduction may have on the listed or candidate species. The FWS recommended that the FAA prepare a biological assessment for the Proposed Project pursuant to the requirements of 50 CFR 402.12 on these issues.

As a result of meetings with the NPS and FWS, the FAA and HDOT have prepared a biological assessment in cooperation with the FWS consistent with the requirements and procedures of 50 CFR 402.12. The biological assessment summarizes the information that is

available regarding the introduction of alien species including information from the ASAP, and recent studies. This information was provided in connection with the Draft EIS regarding its analysis of the potential impact the Proposed Project may have on the introduction rate of alien species to Maui.

Based upon the analysis provided in the Draft EIS, and as discussed in the ASAP Project and CGAPS, appropriate mitigation measures that are reasonable, feasible and prudent have been discussed in detail in the biological assessment. A copy of the biological assessment and the biological opinion prepared by the FWS in response to the biological assessment will be included as an appendix to the Final EIS and the mitigation measures summarized in the Final EIS. (See attachment "mitigation measures")

COMMENT AC-4 - Tourism and Growth Inducing Impacts of Proposed Project

Tourism is Hawaii's number one economic generator and, on Maui, almost one-half of the population is directly involved with tourism, and it is likely that a significant portion of the resident population first came to Maui as tourists. To ignore tourism as an economic generator for the State would have devastating effects on the overall economy of the State. The Proposed Project is in response to existing and forecast aircraft and passenger levels. As indicated in the Draft EIS (see Sections 3.5 and 3.6) infrastructure such as the lengthened runway *facilitates* growth but does not *induce* growth.

The growth inducing impacts of both the Proposed Project and international flight operations were comprehensively studied in the "Socio-economic Impact Assessment of Proposed Kahului Airport Master Plan Improvements" (the SIAR), attached as Appendix E to the Draft EIS.

Information from the SIAR was summarized and incorporated into the following sections of the Draft EIS: Section 3.5 (Socio-Economic Impacts); Section 3.6 (Secondary (Induced) Socio-Economic and Economic Impacts); and Section 6.0 (Growth Inducing Impacts). The SIAR also analyzed the specific growth inducing impacts associated with *international* flight operations at Kahului Airport. This analysis was summarized and incorporated into Section 6.0 (Growth Inducing Impacts) and Section 8.2.5.22 (Growth Inducing and Cumulative Impacts of International Flight Operations).

The purpose of the SIAR was to determine whether the Proposed Project and/or international flight operations will cause an increase in the number of visitors coming to Maui and, by extension, increase the population, number of jobs, economic activity, etc. beyond that which would occur if the Proposed Project were not implemented and international flights were not capable of being accommodated.

The SIAR focused on the possible impacts caused principally by growth in the visitor industry attributable to lengthened runways and international arrival facilities; as these two facilities have the greatest potential to induce growth. It should be noted, however, that international arrival facilities are not part of any Master Plan alternative, including the Proposed Project. They are studied in the SIAR and discussed in the Draft EIS in response to a court order requiring an evaluation of internationalization.

After analyzing the lengthened runway and international arrival facilities within the context of the Hawaii tourist industry, and after interviewing numerous travel experts, the consultants who prepared the SIAR concluded that neither component will generate significant long-term growth on Maui.

Within the State of Hawaii itself, there are several examples where new facilities have generated little or no growth. The Hilo International Airport is an illustration of this situation. Hawaii has also experienced situations where growth occurred despite the fact that the existing facilities could not accommodate the increase in people and traffic. Kahului Airport itself was placed in this position in the 1980s when tourism grew rapidly and out paced improvement efforts at the Airport.

Ultimately, the SIAR concluded that growth on Maui, if it is to occur, will take place as the result of factors not related to the Proposed Project or to international arrival facilities. This conclusion is based upon the analyses summarized and discussed in the SIAR, including the following facts:

- There are no approved or pending projects (other than airport projects) whose construction is contingent upon the Proposed Project;
- Although the existence of an adequate airport is one of many factors which contribute to an area's economic vitality, there are no data which suggest that this Proposed Project would lead to future islandwide growth. In other words, this

project alone would not induce new businesses or residents to locate in Maui or more tourists to come to Maui. Other more critical factors would include such items as the availability of housing and the labor pool. On the other hand, failure to implement this project might induce some existing businesses to consider relocating out of Maui and may result in a reduction in the tourism industry on Maui.

Note that the SIAR, in addition to evaluating the *"most probable"* growth inducing impacts of the Proposed Project, conducted a sensitivity analysis to determine the *"potential maximal"* growth inducing impacts of the project. In performing this sensitivity analysis, the SIAR made a number of "worst case" growth assumptions regarding tourism and air travel to Maui. These assumptions were designed to maximize the growth results.

Ultimately, the "maximal growth" sensitivity analysis -- despite producing growth numbers which could be judged technically "significant" -- confirmed the SIAR's initial conclusion that the Proposed Project would have little or no impact on growth. The SIAR also compared the growth forecasts of the Maui County Community Plans against those found in the HDOT's "Updated Aviation Demand Forecast". The comparison showed that the visitor growth rates used by HDOT and Maui County are very similar.

For an expanded discussion of the growth inducing impacts of the Proposed Project and international flight operations, please consult the SIAR (Appendix E), and Sections 3.5, 3.6, 6.0 and 8.25.22 of the Draft EIS. The SIAR also includes a complete description of its methodology and assumptions, as well as a list of tourism experts interviewed as part of this study.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)

Ed Crovo
General Manager

Hyatt Regency Maui
200 Nohea Kai Drive
Lahaina, Maui, HI 96761-1955 U.S.A.

Telephone: 808 661 1234
FAX: 808 661 0062

1946

HYATT REGENCY MAUI
RESORT AT KAANAPALI BEACH

June 21, 1996

Mr. Dave Welhouse
Federal Aviation Administration
Honolulu International Airport
Honolulu, HI 96813

Aloha Mr. Welhouse:

On behalf of the employees of the Hyatt Regency Maui, I would like to express a sincere interest in favor of expanding the runway at Kahului Airport. An expansion of the runway would be a logical next step for an island that depends on tourism for a healthy, viable economy.

Maui is becoming the premier island of choice among the traveling public to Hawaii. Tourism figures from Hawaii Visitors Bureau indicate that Maui is experiencing the highest growth rate in eastbound and westbound visitors to the islands. Naturally, these type of figures should warrant an expansion of the runways to accommodate the growth in visitor arrivals, and to promote a more convenient form of transportation to and from the destination. This could only be viewed as a positive step toward being competitive in servicing our guests from abroad.

I am confident the investment to expand at Kahului Airport would, without question, be a tremendous asset to strengthening Maui's leading industry–tourism.

Mahalo nui loa.

Ed Crovo
General Manager

EC/srb

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GOVERNOR

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IN REPLY REFER TO
AIR-EN
97.930

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

August 20, 1997

Mr. Ed Crovo
General Manager
Hyatt Regency Maui
200 Nohea Kai Drive
Lahaina, Hawaii 96761-1955

Dear Mr. Crovo:

Subject: Comments on Draft Environmental Impact Statement (EIS)
Kahului Airport Improvements, Kahului, Maui
State Project No. AM1011-07

Thank you for your comments on the Draft EIS for the proposed Kahului Airport Improvements. Your support in your letter of June 21, 1996 is appreciated. The purpose for the Proposed Project is stated in Section 2.3 of the Draft EIS. Your letter and this response will be appended to the Final EIS for review by decision makers.

If you have any questions, please contact Ben Schlapak, Head Planning Engineer, of our Airports Division at (808) 838-8821.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Attachment: As noted above

c: Federal Aviation Administration (D. Welhouse)