2003-04-08-HA-FEA

Final Environmental Assessment

Department of Hawaiian Home Lands / Hakalau Forest National Wildlife Refuge

Fuel Break Construction Project

Island of Hawai'i

State of Hawaii
Department of Hawaiian Home Lands
Land Management Division
Honolulu, Hawaii

and

Department of the Interior
U.S. Fish and Wildlife Service
Region 1, Portland, Oregon

March 2003

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

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DEPUTY TO THE CHAIRMAN

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HHL EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

March 27, 2003

To: The Honorable Chiyome Fukino
Department of Health

Attn: Genevieve Salmonson, Director
Office of Environmental Quality Control

From: Micah A. Kane, Chairman
Hawaiian Homes Commission

Subject: Finding of No Significant Impact (FONSI) for the Department of Hawaiian Home Lands/Hakalau Forest National Wildlife Refuge Fuel Break Construction Project, North and South Hilo, Hawaii

The Department of Hawaiian Home Lands has reviewed the comments received during the 30-day public comment period, which began on February 8, 2003, on the draft environmental assessment for the above-referenced fuel break project.

At its regular monthly meeting held March 25, 2003, the Hawaiian Homes Commission granted the determination of Finding of No Significant Impact (FONSI) for the Final Environmental Assessment, dated March 2003. Please publish this notice in the April 8, 2003, OEQC Environmental Notice.

A completed OEQC Publication Form and four copies of the Final Environmental Assessment report are attached. Should you have any questions, please call me at 586-3801, or Linda Chinn, Acting Land Management Branch Manager, at 587-6432.

Attachments

c: Dick Wass, Hakalau Forest NWR

Final

Environmental Assessment

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Region 1, Portland, Oregon

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Summary Information

Title:	Final Environmental Assessment: Department of Hawaiian Home Lands and Hakalau Forest National Wildlife Refuge Fuel break Construction Project		
Proposed Action:	Fuel Break Construction		
Proposing Agencies:	State of Hawaii Department of Hawaiian Home Lands P.O. Box 1879 Honolulu, Hawaii 96805	and	U.S. Fish & Wildlife Service Hakalau Forest NWR, BINWRC 32 Kinoole Street, Suite 101 Hilo, Hawaii 96720
Location:	North and South Hilo district, Island of Hawaii. Portions of Tax Map Key numbers (District 3) 2-9-005:005, 3-7-001:010, 3-8-001:009, 3-8-001:002, 2-6-018:002.		
Determination:	Finding of No Significant Impact		
Approving Agency:	Same as above		
Permits Required	Grubbing. Agencies working with NRCS to develop Conservation Plan		

AGENCIES AND ORGANIZATIONS CONSULTED OR CONTACTED IN PREPARING THE DRAFT ENVIRONMENTAL ASSESSMENT

Federal:	National Park Service, Hawaii Volcanoes National Park U.S. Fish and Wildlife Service, Ecological Services, Honolulu U.S.D.A., Natural Resources Conservation Service (Hilo, Waimea)
State:	Hawaii Division of Forestry and Wildlife, Hawaii District Department of Hawaiian Homelands DLNR Historic Preservation Division Office of Hawaiian Affairs
Private:	Kahu ku Mauna The Hawaiian-Environmental Alliance Edith Kanakaole Foundation Liliuokalani Trust Hawaiian Civic Clubs of Hamakua, Laupahochoe, and Waimea Kumu Pono Associates Waimea Homesteaders Association

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Acknowledgments

We would like to thank the many individuals who assisted in the preparation of this document. Many thanks to Laura Carter Schuster and the NPS crew, Mara Durst, Paul Chattey, and Laila Tamimi, for the Cultural Resources Survey and to Laura for assisting in the development and review of the Cultural Impact Assessment. DHHL Land Management Administrator Mike McElroy, and representatives Linda Chinn, Ed Andrade, and Jim Dupont, for supporting and cooperating on this project. Kepa Maly for advice and for commenting on the Cultural Impact Assessment as well as offering a wealth of historic knowledge about trail systems, and cultural uses in the surrounding area of Hakalau Forest. Ululani Sherlock, Victoria Holt-Takamine, Mike Robinson, Rebecca Alakai, Brandi Beudet, and Donn Carlsmith, Holly McEldowney, and Kepa Maly for attending a site visit of the area proposed for fuel break construction and for providing comments and expressing opinions and suggestions about the project. Ed Stevens for providing information and associated correspondence on the Keanakolu Road improvement project and for offering his comments on the fuel break project. Also, thanks to Lou Ann Speulda for reviewing and revising Sections of the Architectural Survey of the Cultural Resources Report, Thane Pratt for use of his historic map collection for referencing road and trail systems in the Hakalau area, and to Jack Jeffrey for the use of his photographs. Lastly, many thanks to Holly McEldowney for providing historic information on Hawaiian uses of Hakalau Forest and the greater landscape of Mauna Kea, and to Jon Giffin and Roger Imoto for background and historical information on the use of state forest reserves, roads, and cabins, and for commenting on the plan.

Executive Summary

Alternatives presented in this Final Environmental Assessment (FEA) are intended to determine the best possible way to create fuel breaks within the upper area of Hakalau Forest NWR and adjacent lands. The DEA serves as the basis for a decision by the USFWS on which alternative, if any, to implement. Actions proposed in the DEA would take place on private and publicly owned lands in the district of South Hilo on the island of Hawaii.

Summary of proposed alternatives:

Alternative 1 Construct Fuel breaks on State DHHL and private lands adjacent to Hakalau Forest NWR

Alternative 2 Construct Fuel breaks on Refuge only with gulch crossings on DHHL land

Alternative 3 Use Existing Roads/Breaks on Refuge and adjacent lands as fuel breaks

Alternative 4 Construct Fuel breaks on Refuge and DHHL lands (Preferred Alternative)

Alternative 5 (No Action). Do not construct fuel breaks or regrade existing roads on lands within or adjacent to Hakalau Forest NWR

Agency Determination

None of the alternatives being proposed are expected to cause significant, irreversible impacts to the environment, pursuant to the significance criteria established by the Environmental Council (Hawaii Administrative Rules, Section 11-200-12); therefore, the agency determination is a Finding of No Significant Impact (See Chapter 5: Summary of Significance Criteria).

FINAL ENVIRONMENTAL ASSESSMENT: DEPARTMENT OF HAWAIIAN HOME LANDS AND HAKALAU FOREST NWR FUEL BREAK CONSTRUCTION PROJECT

1. PURPOSE AND NEED FOR THE ACTION

1.1 INTRODUCTION

This Final Environmental Assessment (FEA) was prepared by the USFWS Hakalau Forest NWR with the cooperation of Department of Hawaiian Home Lands. It presents a range of alternatives to create fuel breaks within and immediately adjacent to Refuge lands. It also analyzes the possible environmental effects of the alternatives, and serves as the basis for a decision on which alternative, if any, to implement.

1.2 PROPOSED ACTION

To create fuel breaks within the upper elevation areas of Hakalau Forest NWR and adjoining lands. Heavy growth of pasture grasses, areas of high gorse infestation, and a greater potential for man-made ignition, increases the risk of fire in the area

1.3 PURPOSE OF PROPOSED ACTION

The creation of fuel breaks at Hakalau Forest NWR, funded through the NWR system's Wildland Urban Interface Program (WUI), is intended to protect adjacent landowner's resources in the event that a fire may ignite within Refuge boundaries and spread onto adjacent lands. Secondly fuel breaks will provide protection to Refuge resources should a fire ignite off Refuge (Figure 1).

1.4 NEED FOR THE PROPOSED ACTION

Between 1990-2000, Hakalau Forest NWR experienced five years of drought (1992-93, 1995, 1998, and 2000; Appendix A). Annual rainfall at the 6000' elevation, normally between 78-118 inches, ranged between 40-68 inches during these years, including 2-3 months with no rain. The recent tendency toward drought during El Nino events, combined with the regrowth of long pasture grasses following removal of cattle and establishment as a National Wildlife Refuge, has made the threat of fire much greater to the upper areas of Hakalau. Areas with increased human activity (near facilities, roads, etc.) adds to the risk of fire. Unintentionally set fires may be carried off the Refuge quickly and onto adjacent lands. The creation of fuel breaks would prevent the spread of fires, protecting adjacent landowner resources, described below, as well as protecting the Refuge's native and endangered species, fence lines, structures, and watershed.

1.4.1 Landowner Resources

Currently most of the land adjacent to the Refuge used for cattle grazing by the Department

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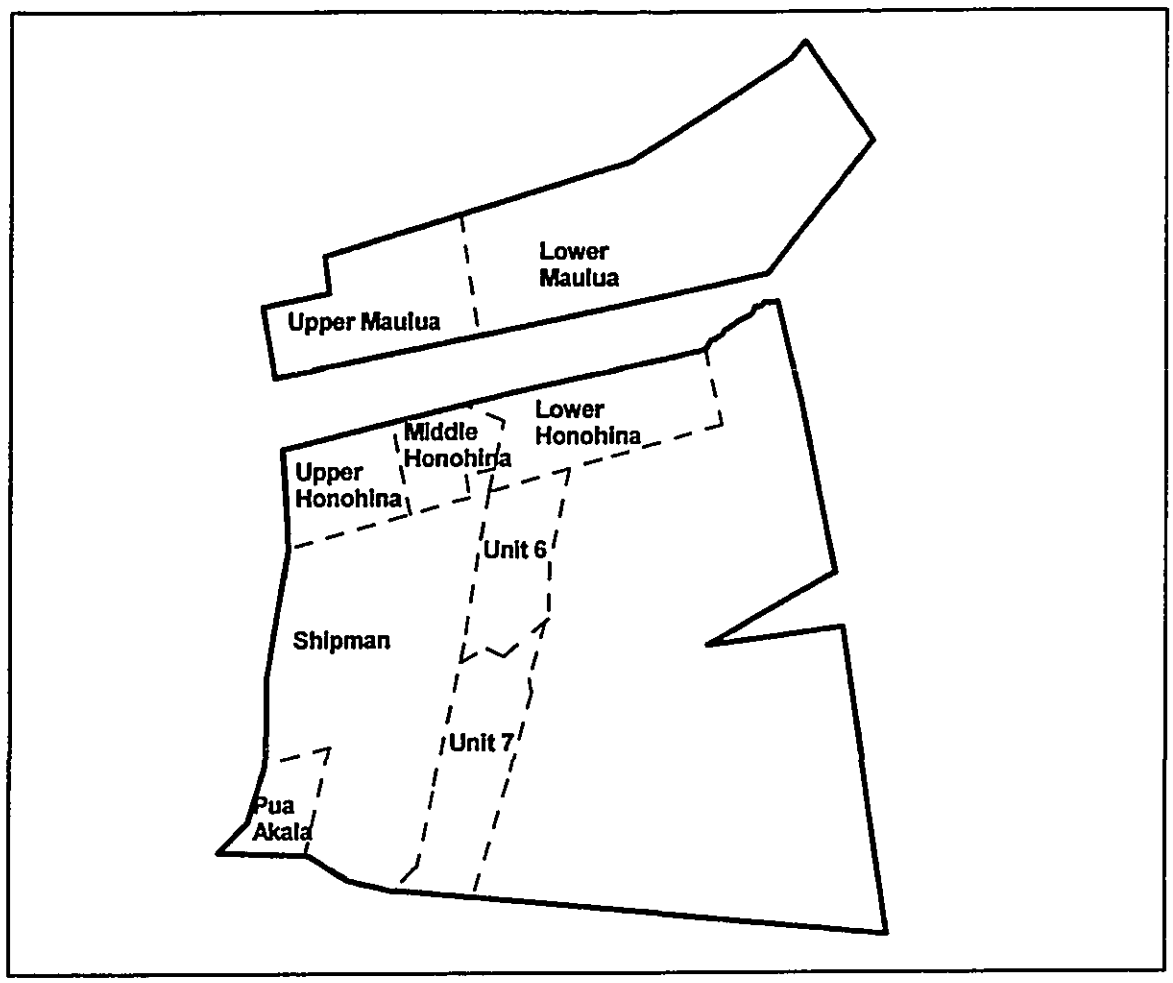

Figure 1.

Refuge Location
and Fenced Units

of Hawaiian Home Lands (DHHL) organization and their lessee's Parker Ranch and Alfred Nobriga, Sr. Mr. Nobriga and the George Robertson Family own parcels to the north of the Refuge's Upper Maulua Unit. Fire may directly threaten livestock in a fast moving fire (especially in gorse fires), or have a secondary effect by alarming pregnant heifers and causing miscarriages. Livestock structures and equipment, fence lines, and water systems may be destroyed in the event a fire escapes the Refuge. Pasture grass will be temporarily reduced following fire, resulting in less cattle forage over a period of months until grasses reestablish. DHHL is also involved in an experimental agroforesty operation (partnered with the U.S. Fish & Wildlife Service), in an attempt to contain the spread of the noxious shrub, gorse (*Ulex europus*). The plan calls for planting native *koa* trees in a 195 acre area immediately adjacent to the Refuge. A separate plan by DHHL, detailed in the *Final Environmental Assessment for Koa Salvage-Reforestation and Gorse Containment at Humuula, Island of Hawai'i* (2001), calls for planting areas further upslope with koa and non-native coniferous trees in an effort to shade, and control the gorse infestation (Figure 8). If the project is successful, the trees will reduce the gorse infestation and may become a source of income for DHHL. Fire could severely threaten this venture and should be prevented. Between the Refuge's Honohina and Maulua Unit is the Piha tract, managed by the State Division of Forestry and Wildlife (DOFAW). This land is in conservation and is used by the public for hunting and gathering activities. It remains forested with native and exotic trees planted by the state over 50 years ago.

1.4.2 Structures and Facilities

At the northwest corner of the Maulua tract is a 40 acre parcel owned by Alfred Nobriga, Sr., and two 40 acre parcels owned by George Robertson and family. Nobriga's ranch house, approximately 0.25 mi. from the Refuge boundary, is inhabited 80% of the time. There are also associated ranch implements water delivery systems, fences, and livestock. There are no structures on the Robertson parcels. Hopuwai cabin is located 0.25 miles west of the Refuge's Honohina Unit and also exists on land leased to Alfred Nobriga, Sr. by the Department of Hawaiian Home Lands (DHHL). Further north of the Refuge (2.7 miles) is Keanakolu Ranger station which is owned and maintained by the State of Hawaii and the Dr. David Douglas State Historic Monument (0.8 miles from the Refuge boundary).

Land to the south and west of the Refuge's Pua Akala and Shipman parcels is owned by DHHL, Keolahou Land Trust, and Parker Ranch (DHHL lessee). Six structures (3 residences, greenhouse, tack house, and storage shed) exist on Keolahou ranch, located approximately 4.5 miles south of the Refuge (B. Horiuchi, pers. commun.). The parcel leased to Parker ranch does not contain any maintained structures. On both of these properties, a mixture of pasture and gorse patches can be found. (Figure 2).

1.4.3 Refuge Resources

Currently the Refuge acts as a watershed for the North and South Hilo districts of the Big Island. The Refuge also provides habitat for native and endangered plants and animals and

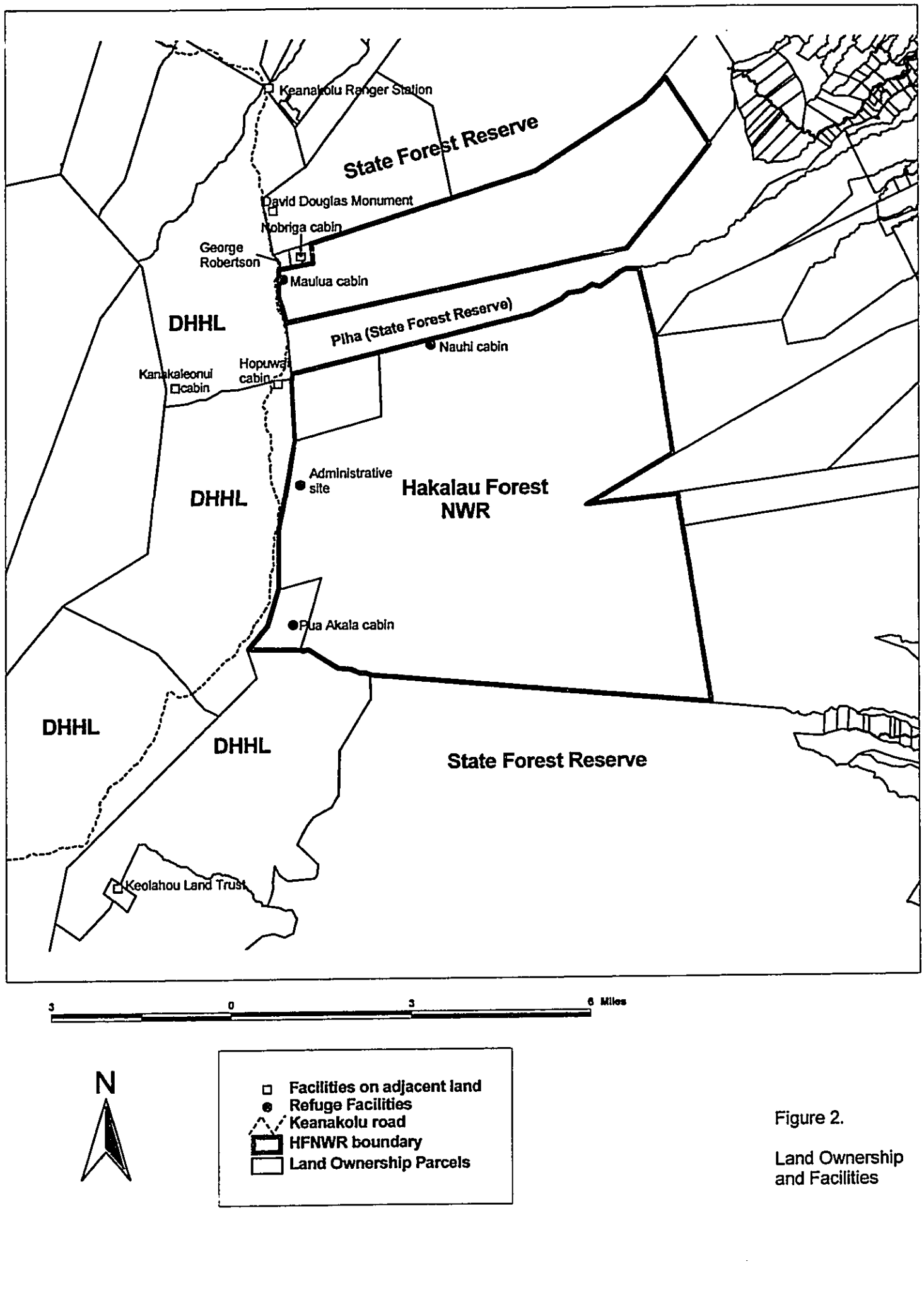

Figure 2.

Land Ownership and Facilities

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

of Hawaiian Home Lands (DHHL) organization and their lessee's Parker Ranch and Alfred Nobriga, Sr. Mr. Nobriga and the George Robertson Family own parcels to the north of the Refuge's Upper Maulua Unit. Fire may directly threaten livestock in a fast moving fire (especially in gorse fires), or have a secondary effect by alarming pregnant heifers and causing miscarriages. Livestock structures and equipment, fence lines, and water systems may be destroyed in the event a fire escapes the Refuge. Pasture grass will be temporarily reduced following fire, resulting in less cattle forage over a period of months until grasses reestablish. DHHL is also involved in an experimental agroforesty operation (partnered with the U.S. Fish & Wildlife Service), in an attempt to contain the spread of the noxious shrub, gorse (*Ulex europus*). The plan calls for planting native *koa* trees in a 195 acre area immediately adjacent to the Refuge. A separate plan by DHHL, detailed in the *Final Environmental Assessment for Koa Salvage-Reforestation and Gorse Containment at Humuula, Island of Hawai'i* (2001), calls for planting areas further upslope with koa and non-native coniferous trees in an effort to shade, and control the gorse infestation (Figure 8). If the project is successful, the trees will reduce the gorse infestation and may become a source of income for DHHL. Fire could severely threaten this venture and should be prevented. Between the Refuge's Honohina and Maulua Unit is the Piha tract, managed by the State Division of Forestry and Wildlife (DOFAW). This land is in conservation and is used by the public for hunting and gathering activities. It remains forested with native and exotic trees planted by the state over 50 years ago.

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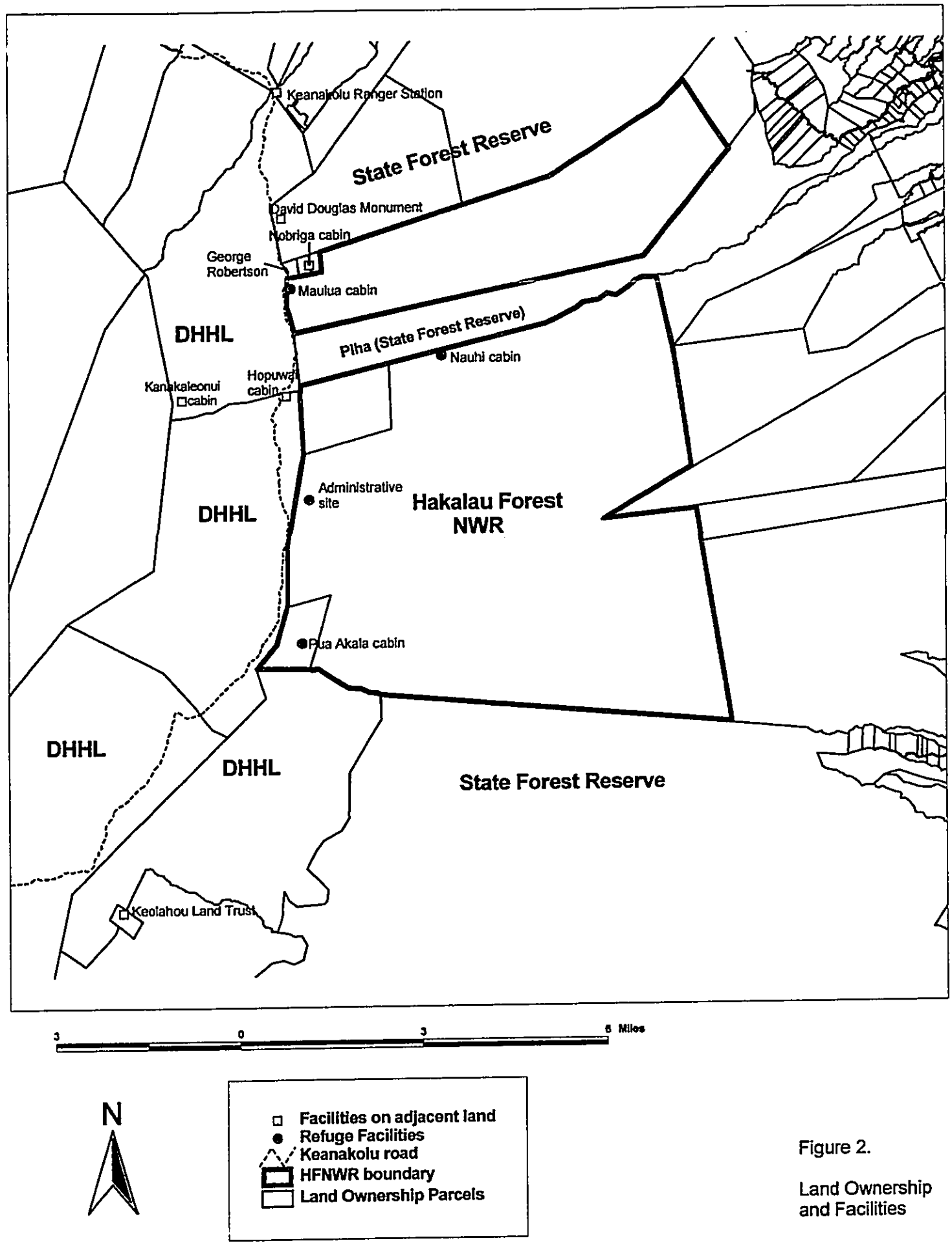


Figure 2.

Land Ownership and Facilities

has been the focus of an extensive reforestation program for 14 years. Over 250,000 native trees have been planted in former pasture lands, greatly increasing the Refuge's habitat value for native birds, insects and plants. The Refuge has also constructed many miles of pig-proof fence in order to prevent habitat degradation by feral cattle and pigs.

There are several buildings on the Refuge surrounded by either grass or trees. Refuge staff and volunteers are supported by two residence buildings, garage, kennel, greenhouse, and storage shed. In addition, a separate structure is used to house volunteers. A separate photovoltaic /battery building is under construction. Also in the complex of buildings are a cabin built by and for USGS-Biological Resources Division, and a field station operated by the University of Hawaii. The University also maintains a field site (unimproved, rain shelter) in the Pua Akala area, approximately 2 miles south of the administrative site. Maulua cabin exists in the Upper Maulua unit. There are two buildings being considered for the National Historic Register (Figures 16, 18). One is a cabin in the Pua Akala parcel built circa 1883, and the other is Nauhi cabin built in the Honohina parcel in the 1920's (Figure 2, Appendix C).

1.4.4 Historic Role of Fire at the Refuge

Fire appears to be a relatively infrequent, low intensity disturbance in native Hawaiian ecosystems, occasionally ignited by lava flows or lightning strikes (Mueller-Dombois and Lamoureux 1967; Mueller-Dombois 1981b; Smith and Tunison 1992). Ecologists conclude that natural fire has not played a significant ecological or evolutionary role in most native Hawaiian ecosystems. In many cases, the introduced species in these ecosystems are better adapted to fire than the native plants. At Hakalau Forest, fire may have played a significant role historically, especially in the drier upper elevations of the Unit (J. Jacobi, pers. comm.). While some of the species in this zone are fire tolerant (*e.g. mamane, naio, ohelo*, native bunchgrass), none require fire to regenerate, and they all can be killed by intense fire (Smith and Tunison 1992). Although *koa* are almost always killed by fire, seeds in the soil survive and are stimulated to germinate after fire (Scowcroft and Ward 1976). The tall, ungrazed, non-native grasslands that presently occur on the Refuge greatly increase the risk of fire.

Tomonari-Tuggle (1996) cites Hall 1904, describing a fire following a drought in the Hamakua district which is a few miles to the north of the Refuge: "It burned an area 15 miles long and 2 to 4 miles wide, leaving unburned only occasional patches. Trees, undergrowth, and humus were generally completely destroyed. This forest was a normal one for the islands, consisting of a fairly heavy growth of *lehua* and *koa*, with a heavy undergrowth of fern and a deep accumulation of humus. Ordinarily, this forest could not have been burned, but a severe drought prevailing for several months previously had dried it out to the point where it burned with great rapidity." "There is distinct evidence of a severe fire upward of fifty years ago in the southern part of Hamakua. This fire burned over a tract of large, though unknown extent. It killed practically all the forest and

thick."

Since becoming part of the Refuge system in 1985, the Hakalau Refuge sustained its first wildland fire in 2000. Between 2000-2002 it was particularly dry and all 7 incidents were human caused. Table 1 tracks the events of these years. The Refuge responded to four fires that threatened the Unit from adjacent lands, with fronts reaching the south and west boundaries. Primary fuel was gorse. The Maulua fire occurred inside the Refuge and burned 5 acres of mesic habitat. Primary fuel was kikuyu grass (*Pennisetum clandestinum*). The most recent fire, a result of gorse burning by neighboring landowners, burned to within 100 feet of the Refuge's southwest boundary.

Table 1: Recent Fire History at Hakalau Unit (2000-2002)

Name of Fire	Inclusive Dates	Approximate Acreage
Aahuwela	2/24/00 - 2/26/00	1400
Aahuwela II	3/16/00	3
Maulua	7/28/00 - 8/1/00	5
Piihonua	8/16/00 - 8/18/00	200
Aahuwela	1/04/01 - 1/06/01	3
Gorse Fire	6/23/01	0.5
Pua Akala Gorse Fire	11/7/02-11/13/02	250

4.5 Change in Forest Structure

The historic destruction of native vegetation has caused microclimatic changes especially at the upper elevations of the Refuge. Forest clearing and grazing have created extensive open pasture resulting in increased wind speed, reduced moisture collection from fog drip, and more pronounced fluctuations in temperature. As a result, frost damage appears to be one of the primary causes of planted seedling mortality at upper elevations. The severity of climatic influences in these areas is a major obstacle to reforestation. This is also the area most prone to fire due to the heavy regrowth of pasture grasses following establishment as a NWR and subsequent removal of cattle. Fire hazard further increases during periods of drought.

1.4.6 Fire Behavior

Fire behavior under drought conditions is expected to range from fast running fire with 6-10 ft. flame heights in open grassland to slow smouldering creeping fire in the intact rainforest. Gorse fires are highly flammable with estimated 40-60 ft. flame lengths. Normal

wind patterns on the Refuge are upslope southeast winds during the day, with wind switching direction and moving downslope in the evening as the mountain cools.

1.4.7 Refuge Wildland Fire Management Plan

In 2002 a Draft Wildland Fire Management Plan was completed for Hakalau Forest NWR. The plan serves as a guideline for responding to wildland fires in or adjacent to the Refuge. A detailed plan including a Dispatch Response Plan, Interagency cooperation, protection of biological and Cultural Resources, as well as fire management strategies for wildland and prescribed burns are outlined. The plan calls for hazard reduction and preparedness (e.g. budget, equipment, dispatch, personnel and training) in case a fire situation occurs at the Refuge.

The maintenance of existing or recovering rainforest at the Refuge does not require fire ecologically because it did not evolve with it. For this reason, suppression of all unplanned ignitions to *minimize* acreage loss is the policy employed over the entire Refuge.

Extended drought conditions are monitored through collection of weather data (Appendix A) which is used to implement a step-up plan. Burn indices are used to warrant the level of preparedness, including shutting down the public access program in the Maulua Unit, and suspending guided tours in the Pua Akala and Shipman units.

The plan calls for "hazard reduction" by removing grasses either mechanically or chemically around Refuge structures. Grass is currently mowed around the main Refuge cabin and trees around the Pua Akala Cabin have been thinned to mitigate fire concerns. The plan calls for annual maintenance at all the sites. Other measures include using roads, existing breaks, or other natural features for control lines or anchor points, and using burn outs to stabilize and reinforce control lines. The Refuge currently maintains a small network of existing fuel breaks by mowing at least twice per year.

Current suppression capability at the Refuge consists of a 200 gallon slip-on unit and a D-4 bulldozer. The Refuge maintains a 10 person fire cache consisting of hand tools, personal protective equipment, field packs, back pack pumps, chainsaws, trash pumps and first-aid supplies. Other equipment includes 4X4 vehicles and a 400 gallon portable trailer. The Refuge staff are trained in fire suppression and are geared for initial attack actions based around a slip-on-unit (portable water tank, pump and hose).

The Refuge plan also recognizes the need for an active fire prevention program including the use of visitor handouts and interpretation to increase visitor and neighboring landowner awareness of fire hazards.

1.5 AUTHORITIES AND REGULATORY COMPLIANCE

1.5.1 Authorities

USFWS, Endangered Species Act of 1973 (as amended in 16 U.S.C.1531-1544, 87 Stat. 884), Section 7 Consultation, DLNR's Hawaii Endangered Species Law (HRS 195D). Refuge Administration Act.

1.5.2 Compliance

Federal and State policies and the following laws and regulations: NEPA ; Executive Order 12372; ESA; HRS 195D; HRS 343, NHPA Section 106 and HRS 343 Act 50.

1.6 SCOPING ISSUES AND CONCERNS

The USFWS and State Department of Hawaiian Home Lands has made a concerted effort to solicit input from potentially affected parties and to adequately address concerns. Pursuant to this effort, the USFWS has solicited comments from adjacent land owners, Native Hawaiian groups, the general public, and State and Federal agencies. The primary means of scoping were direct contacts (meetings, site visit, telephone conversations, letter and email correspondence) with individuals or organizations having potential interest in the proposed action (Appendix C, D, E, F, and Section 7).

2. ALTERNATIVES

2.1 ISSUES REQUIRING AN ENVIRONMENTAL ASSESSMENT

The issues requiring an Environmental Assessment include how to construct and maintain fuel breaks while minimizing impacts to native forest, endangered species, and cultural resources.

2.2 FEATURES COMMON TO ALL ALTERNATIVES

Measures to mitigate anticipated adverse effects are described in detail in section 2.2.6 and Section 4, Environmental Consequences.

2.2.1 Methods for Fuel Break Construction

New construction and grading of existing roads and fuel breaks would be done by contract

with a D-7 and/or D-8 bulldozer. Fuel breaks will be cleared of vegetation and loose, protruding rocks greater than six inches. Breaks will be cut and smoothed so that they may be driven by four-wheel-drive vehicles and fire trucks to facilitate access to fires. During construction cut and fill areas will be minimized, and dips and water bars will be established to minimize soil erosion. New breaks will reseed naturally (within 1-2 months) stabilizing the ground cover. Breaks proposed for existing roads (already exposed to mineral soil) will have shoulders smoothed and graded. Portions of two existing roads on adjacent lands are proposed for fuel breaks in Alternatives 1 and 3 (Keanakolu and Robertson /Nobriga roads). These roads will not require maintenance beyond initial smoothing as fuel levels in the area are low due to cattle grazing. All other fuel breaks will be smoothed to facilitate seasonal mowing, disking, or herbicide spraying to maintain low fuel biomass. Trees to be removed occur only on Refuge lands and will be pushed away from the fuel break and allowed to rot. Break width will be determined by fuel types and will be maintained at twice the expected flame height. Breaks in grassland areas will be cleared and smoothed to a width of 25 ft. Breaks in the area of high gorse infestation will be cleared and smoothed to 100 ft. width, and areas with moderate levels of gorse infestation will be cleared to a width of 50 ft. A wider fuel break in the southwest corner of the Refuge is necessitated by the increased fire hazard brought by a large infestation of gorse on DHHL lands (Figure 8). Where fuel breaks occur on both sides of the Refuge boundary, 14-16' ft. pipe gates will be installed so fire fighting and maintenance equipment can pass through.

2.2.2 Removal of Fuel Hazards from Structures

Brush will be cleared manually (chainsaw, machete, weedeater) from three cabin facilities (Maulua, Nauhi, Pua Akala) to a distance of 50 ft. from structures. Exotic plants which are historically related to the cabins will be trimmed but left in place if they are not considered invasive or fire prone species. See protocols in Section 2.2.7 for brushing vegetation from cabin areas. Native trees > 4" diameter at breast height (*dbh*) will be left standing. All cleared brush will be chipped and left to rot outside each cabin's "cultural landscape"as determined by the Cultural archaeologist. Roads bordering the Administrative Site will be regraded and shoulders smoothed to create a 25 foot wide fuel break. A 25' fuel break will also be completed at Pua Akala cabin around the perimeter of the 50 ft. cleared area.

2.2.3 Effects on the Physical environment

Volcanology, Topography, Soils, and Climate

The proposed actions would not affect volcanology or climate of the Refuge. Soil disturbance and erosion is expected to be minimal as alternatives under consideration occur in areas with gradual slopes and that have been previously impacted by roads, fence lines, fuel breaks, or by ranching activity. Topography would be minimally affected by the short-

term impact of fuel break clearing and smoothing. Grasses will reseed in a matter of months, stabilizing ground cover following construction. The proposed action is on the windward east slope of Mauna Kea, a dormant volcano. Underlying lava flows are >10,000 years old (USGS 1996). The area is classified as a Volcanic Hazard Zone 8, on a scale from 1 (most hazardous) to 9 (UH Hilo 1998). The soils are andisols, derived from volcanic ash (UH Hilo 1998, Figure 10). Topography of the area is gradual (9% slope) and undulating.

Hydrology and Water Resources

With the exception of drought periods, the average annual rainfall in the area is between 78-118 inches. During drought, annual rainfall is only 40-60 inches per year, often with no significant rainfall for up to 2-3 months (Appendix A). The eastern slope of Mauna Kea is an important source of groundwater recharge (UH Hilo 1998). There are seven streams /gulches, perennial at lower elevations, but dry at upper elevations, except following heavy rains. Gulches that will be traversed by fuel breaks have been previously modified (e.g. filled to allow equipment passage), by ranching activities on the western (DHHL) side of the Refuge's upper boundary. Existing gulch crossings, will be used to traverse gulches so as not to impact plant communities and stream beds on Refuge lands (Figure 14). From north to south the gulches are; Nauhi stream, Honohina stream, North and South branches of Hakalau stream, Kapue stream, Awehi stream, and Nukupahu stream. No fill will be pushed into stream beds during this project. Native vegetation in stream beds will be left intact.

2.2.4 Effects on the social and economic environment

Population, employment and local economy

Fuel break construction outside the Refuge will improve access primarily on DHHL lands that are currently unimproved. Fuel breaks dozed inside the Refuge will not affect population or employment (visitors or staff) at the Refuge but will improve access for maintenance by Refuge staff.

Land Use

Prior to acquisition by the Federal government, the upper portions of Hakalau Forest NWR were used for cattle grazing. The Refuge is now dedicated for conservation purposes. Neighboring lands to the north, south, and upslope to the west are still in grazing use with experimental agroforestry under consideration by DHHL along a portion of the western boundary of the Refuge (Figure 7). Land use would not change as a result of fuel break construction proposed in this FEA. The state's Piha parcel is managed for public hunting, gathering, and conservation.

Development

Within the Refuge, development is limited to the Administrative site, the Pua Akala cabin and barn, and the Maulua and Nauhi cabins (Figures 16-18). The University of Hawaii also has a research facility built within the Refuge's administrative area. Development immediately outside the Refuge is limited to a small residence owned by Alfred Nobriga, Sr., approximately 0.25 mi. from the northern boundary and Hopuwai cabin, approximately 0.25 mi. from the western boundary of Hakalau Forest NWR (Figure 2). A network of ranch and Refuge roads occurs throughout the area, as well as the main access road, Keanakolu. Development is not anticipated to change as a result of fuel break construction.

Public Use

Public use of lands adjacent to the Refuge is primarily by individuals accessing the state's Piha and Laupahoehoe Game Management Units for pig hunting, fruit picking, and other gathering activities. Other use of lands immediately adjacent to the Refuge includes; off-road recreational vehicle driving, mountain biking, and horseback riding. These activities are not expected to increase as a result of fuel break construction as a well developed access road (Keanakolu) already exists immediately west of the site proposed for fuel break construction.

The Refuge's Upper Maulua Unit is open to public use year-round. Access to the remaining portion of the Refuge is limited to permitted ecotours which focus on bird watching, yearly public information "open houses" and research activities permitted by the Refuge for University, USGS, or other agencies. A number of volunteers and school groups assist the Refuge on weekends taking part in reforestation and weed eradication efforts.

Cultural Resources

Results from the Cultural Resource Survey are described in Section 3.3.1 and Cultural Impacts are described in detail in section 3.3.2

There are cultural and archeological sites on the Refuge of varying significance. Most are rock structures vulnerable to damage by dozer activity or intense heat. Locations and descriptions of cultural features are found in Figure15 and Table 2. There are two buildings being considered for the National Historic Register. One is a cabin in the Pua Akala parcel built circa 1890, and the other is a cabin built in the Honohina parcel in the 1920's

An interagency agreement was made between the U.S. Fish and Wildlife Service, Hakalau Forest NWR and the National Park Service to conduct a survey of Alternatives covered in this FEA. Results of the archeological survey of fuel breaks and cabin locations (Pua Akala,

Nauhi, and Maulua) are included in a separate report titled: A Cultural Resource Report for the Hakalau Forest National Wildlife Refuge Wildland Urban Interface Firebreak Project, on file at the Refuge Office in Hilo.

2.2.5 Effects on the biological environment

Native biodiversity

Hakalau Forest NWR is characterized by wet *ohia/koa* forest below 5000' ft. elevation. The forest extends upward into mesic koa/ohia forest where it is bordered at the upper reaches (~5,500') by disturbed *koa/ohia* forest and finally pasture at about 6000' (Figure 9). Intact forested areas would not be impacted by proposed alternatives. Remnant tree stands in degraded forest and recently planted *koa* trees in open pasture near the Refuge boundary will be impacted by the creation of fuel breaks. This will occur where individual trees are within 25 ft. of the Refuge boundary line, and where a reasonable way to avoid the tree(s) could not be negotiated by the bulldozer. Common native forest birds (*amakihi, elepaio, omao, apapane*, and *iiwi*) do not occur in high numbers in areas of fragmented forest where the proposed fuel break is to be constructed. In other areas, such as the Maulua Unit and along the northern boundary of Honohina where the fuel break is adjacent to relatively intact stands, common native birds occur in moderate densities (Figure 1). Native forest birds do not occur in grassland habitats where most of the fuel break will be constructed.

Endangered, threatened or candidate species

Endangered forest birds (*akepa*, Hawaii creeper, and *akiapolaau*) attain some of their highest population densities at Hakalau Forest NWR (Scott, et. al. 1986). In addition, *koloa* (*Anas wyvilliana*), are sometimes found in catchment ponds of the area, *nene* forage and reproduce within the grassy pasture areas at upper elevations, and *'io* (Hawaiian hawk) occur in high densities (J. Klavitter, pers. commun., 1998).

The Hawaiian hoary bat (*'ope'ape'a*) is also seen seasonally at the Refuge. They are known to forage and possibly roost, in exotic pine plantations and native forest on the Refuge from November-April (T. Menard, J. Jeffrey, pers. commun., 1999).

More than 1,200 endangered plants (6 species) have been propagated in the Refuge greenhouse and outplanted by staff and volunteers on the Refuge since 1998. No outplantings occur in areas proposed for fuel break construction.

Harmful non-native species

Many species of introduced pasture grass brought in for livestock, occur throughout the

upper elevations of the Refuge and surrounding lands. These grasses form thick mats, inhibiting native plant regeneration, and complicate reforestation efforts. Grass also competes with native seedlings for nutrients, light and water (Scowcroft 1992), and can increase the frequency and intensity of fire (Smith and Tunison 1992).

Gorse (*Ulex europus*) is a noxious weed that formerly occurred in large patches of grassland within the Refuge's southwest corner. Gorse control on the Refuge began in 1988 and has resulted in suppression of most plants except for young seedlings. A combination of control methods has been used on gorse including; prescribed burning, herbicide spraying, biocontrol, and manual removal. Although the infestation has been greatly reduced, the 30 year seed viability results in a continual problem with new sprouts. It still occurs in high density on DHHL lands flanking the Refuge's southwest corner (Figure 8.) Gorse provides no habitat for native wildlife and forms impenetrable thickets in which no native plants can establish. In combination with grasses, gorse constitutes the greatest fire risk within and adjacent to the Refuge. DHHL landowners have developed a plan to shade-out gorse by using native koa and exotic pine trees on land immediately adjacent to the Refuge (*FEA Koa Salvage-Reforestation and Gorse Containment, Humuula, Hawaii* 2001).

A number of other introduced tree, vine, and shrub species are the focus of Refuge management and eradication activities. These include banana poka, blackberry, and English holly.

Cattle and pigs have had the greatest cumulative impact on the structure and health of the native forest at Hakalau Forest NWR historically. A total of 14,150 acres of the 33,000 acre Refuge has been fenced as of 2002. Within the fenced units, feral cattle and pigs have been reduced to low numbers or eliminated, allowing recovery of native species (Figure 1).

Other harmful alien species existing on or near the Refuge include; feral cats, feral dogs, mongoose, rats, yellow-jacket wasps, and introduced avian-disease carrying mosquitoes.

2.2.6 Fuel break Mitigation Measures

Prior to construction, all fuel break routes will be flagged by Refuge staff to avoid confusion by the contractor doing bulldozer work along boundaries. Refuge staff will monitor the bulldozer contractor in "sensitive areas" (e.g. near gulches, trees, water lines, cultural features, and fences). This will minimize unwanted negative impacts to adjacent landowner resources near gulch crossings, as well as to assure that only trees previously selected for removal will be impacted. Routes have been selected to minimize erosion and damage to native trees. Fuel breaks will be no wider than necessary to accommodate fuel loads and maintenance vehicles. Cut and fill slopes, dips, water bars, and cross drainages will be constructed to minimize soil erosion following guidelines developed under a Conservation Plan with USDA, Natural Resources Conservation Service. In order to

mitigate the further possibility of erosion, ATV and 4-WD vehicles will not be driven on fuel breaks during periods of wet weather.

Refuge staff will survey areas proposed for construction to ensure no adverse impacts to endangered species that may utilize the area for foraging, nesting, or roosting (e.g. nene, forest birds, bats). Dozing activities will occur outside the *nene* breeding season, normally between November-March. Bulldozing in forest areas will occur outside the forest bird breeding season between January-June. A Section 7 consultation will be prepared and reviewed prior to initiating any of the proposed alternatives. To avoid the introduction of alien weeds, all vehicles and heavy equipment will be cleaned and inspected prior to fuel break construction.

If cultural features are found during fuel break construction or when brushing cabin areas, the Refuge manager will be notified immediately so that he may contact the appropriate cultural resource staff to assist with the assessment of the features.

2.2.7 Fuel break Maintenance

All of the proposed alternatives require resources to maintain fuel breaks twice per year or as frequently as funding allows. Fuel breaks will be maintained by a combination of range disk, mowers, and herbicide spraying. Herbicide spraying will be required in areas adjacent to the gorse infestation. Initially a 100 ft. wide break will be bulldozed where the gorse distribution is the greatest and a 50 ft. wide break will be established in areas with scattered gorse (Figure 8). The 50 and 100 ft. wide breaks will thereafter be maintained at a minimum width of 25 ft. in order to prevent the reestablishment of gorse seedlings/shrubs within and immediately adjacent to the Refuge's southern and western fence line. Herbicide spraying will be conducted by Refuge staff using a boom-sprayer mounted on a tractor, and with backpack sprayers. Where fuel breaks pass through grazing land, cattle will help to maintain low fuel loads. Monitoring fuel breaks for alien weeds will occur during regular fuel break maintenance cycles.

2.2.8 Mitigation Measures for Historic properties

Prior to the development of fuel breaks around the three cabins on the Refuge (Maulua, Nauhi and Pua Akala), each location will be visited by a cultural landscape specialist and a Refuge representative to insure that the agreed upon culturally associated vegetation be avoided during the brushing and firebreak development.

Dense grasses may be obscuring other culturally associated features that were hidden due to the dense vegetation present at all three cabins. Under the advisement of Cultural Resource Specialist, Laura Schuster, mechanical weed eating or herbicide will be used to reduce the

vegetated cover at each location. If features, such as walkways, planting beds, terraces, or fenced areas, are found, the Refuge manager will be notified so that he may contact the appropriate specialist to assess the features.

2.3 IDENTIFICATION OF THE ALTERNATIVES

The National Environmental Policy Act (NEPA) requires that all reasonable alternatives for the proposed action be explored and evaluated. The alternatives described were identified by managers and biologists at Hakalau Forest NWR and were agreed upon by land managers from DHHL.

2.4 ALTERNATIVES UNDER CONSIDERATION

Five alternatives are under consideration for the proposed action. One of the five alternatives is a "No Action" alternative that would involve no fuel break construction, and no regrading / widening of existing roads on lands within or immediately adjacent to Hakalau Forest NWR.

2.4.1 ALTERNATIVE 1: Construct Fuel Breaks on DHHL and private lands adjacent to Hakalau Forest NWR

Construct and re-grade a total of 8.0 miles of fuel break on lands immediately adjacent to, but not within the Refuge (7.3 miles on DHHL, and 0.7 miles on private land). Two existing roads on adjacent lands will be smoothed and used as fuel breaks (0.9 mile section of Keanakolu road, and 0.7 miles on the Robertson/Nobriga road) north and west of the Refuge's Maulua Unit. The fuel break will run immediately adjacent to the Refuge's upper (west) boundary, beginning at the southern fence line of Pua Akala and continuing to the northwest corner of the Honohina unit. Three existing access roads, and three new access roads will be cleared and smoothed within the 195 acre DHHL Gorse Containment /Reforestation area. No native trees will be removed. Brush will be cleared from three cabin facilities (Maulua, Nauhi, Pua Akala), and a 25' fuel break will be completed around the perimeter of the Pua Akala cabin (Figures 3, 16-18).

2.4.2 ALTERNATIVE 2: Construct Fuel Breaks on Refuge land with gulch crossings on DHHL land

Construct a total of 10.6 miles of fuel break only on Refuge lands. This alternative requires an agreement between the Service and DHHL to allow access to 4 gulch crossings immediately west of the Refuge's upper boundary. Eight gates are needed for the fuel break to traverse gulch crossings along the upper boundary and to move between the Pua Akala and Shipman Units. This alternative requires the removal of 14 native trees > 4" dbh

(primarily a grove of recently planted *koa*), three native trees >12" dbh, and two large *koa* trees > 30"dbh. Brush will be cleared from three cabin facilities (Maulua, Nauhi, Pua Akala), and a 25' fuel break will be completed around the perimeter of the Pua Akala cabin. A new 25 ft. wide fuel break will be created on the south side of the of the Refuge's administrative complex. (Figures 4, 16-18).

2.4.3 ALTERNATIVE 3: Use Existing Roads/Breaks on Refuge and adjacent lands as fuel breaks

A total of 16.9 miles of existing dirt roads/breaks will be re-cleared and smoothed to function as fuel breaks. No new breaks will be constructed. 3.6 miles, will utilize roads/breaks on DHHL land, 12.6 miles on the Refuge, and 0.7 miles on a road traversing the Robertson/ Nobriga parcels. 0.9 miles of the Keanakolu road will function as a fuel break, but will not require maintenance, and the Robertson /Nobriga road will be smoothed (not widened) to the north and west of the Refuge's Maulua Unit. Three existing access roads will be cleared and smoothed to a width of 25 ft. within the 195 acre DHHL Gorse Containment /Reforestation area. No native trees > 4" dbh will be removed. Four gates will be installed along the western boundary fence line to allow for fuel break maintenance in areas that traverse Refuge and private land. Brush will be cleared 50 ft. from three cabin facilities (Maulua, Nauhi, Pua Akala) and a 25' fuel break will be completed around the perimeter of the Pua Akala cabin. (Figures 5, 16-18).

2.4.4 ALTERNATIVE 4: Construct Fuel Break on Refuge and DHHL lands

Construct a total of 14.7 miles of fuel break within and immediately adjacent to the Refuge's upper (western) boundary. An existing fence maintenance road on DHHL lands will be re-graded and smoothed along the western boundary of the Refuge. This eliminates the need for numerous gates to traverse gulch crossings between the Administrative site entrance gate and the Honohina unit. Three existing access roads, and three new access roads will be cleared to a width of 25 ft. within the 195 acre DHHL Gorse Containment /Reforestation area. A total of 5.9 miles of fuel break will occur on DHHL lands. The remaining 8.8 miles will occur on the Refuge. Ten gates are required for maintenance and for traversing gulch crossings south of the Administrative site entrance gate. Two additional gates are required between the Entrance and Honohina gate locations. This alternative will require removal of 14 native trees > 4" dbh (primarily recently planted *koa*), three native trees > 12" dbh, and three *koa* trees > 30" dbh. Brush will be cleared from three cabin facilities (Maulua, Nauhi, Pua Akala) and a 25' fuel break will be completed around the perimeter of the Pua Akala cabin. A 25 ft. wide fuel break will be created on the south side of the of the Refuge's administrative complex (Figure 6, 16-18).

2.4.5 ALTERNATIVE 5: (No Action). Do not construct fuel breaks or regrade existing roads on lands within or adjacent to Hakalau Forest NWR

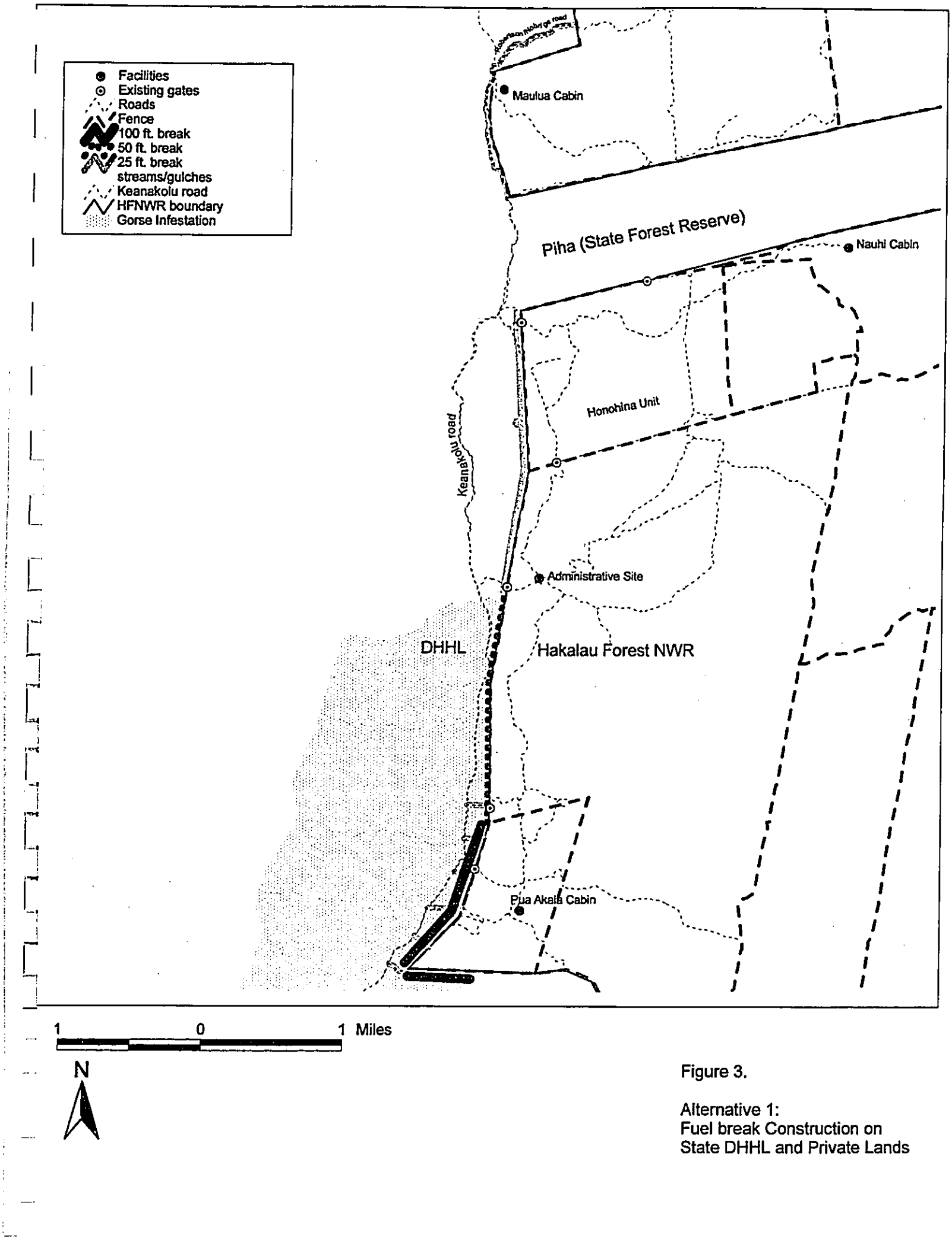


Figure 3.

Alternative 1:
Fuel break Construction on
State DHHL and Private Lands

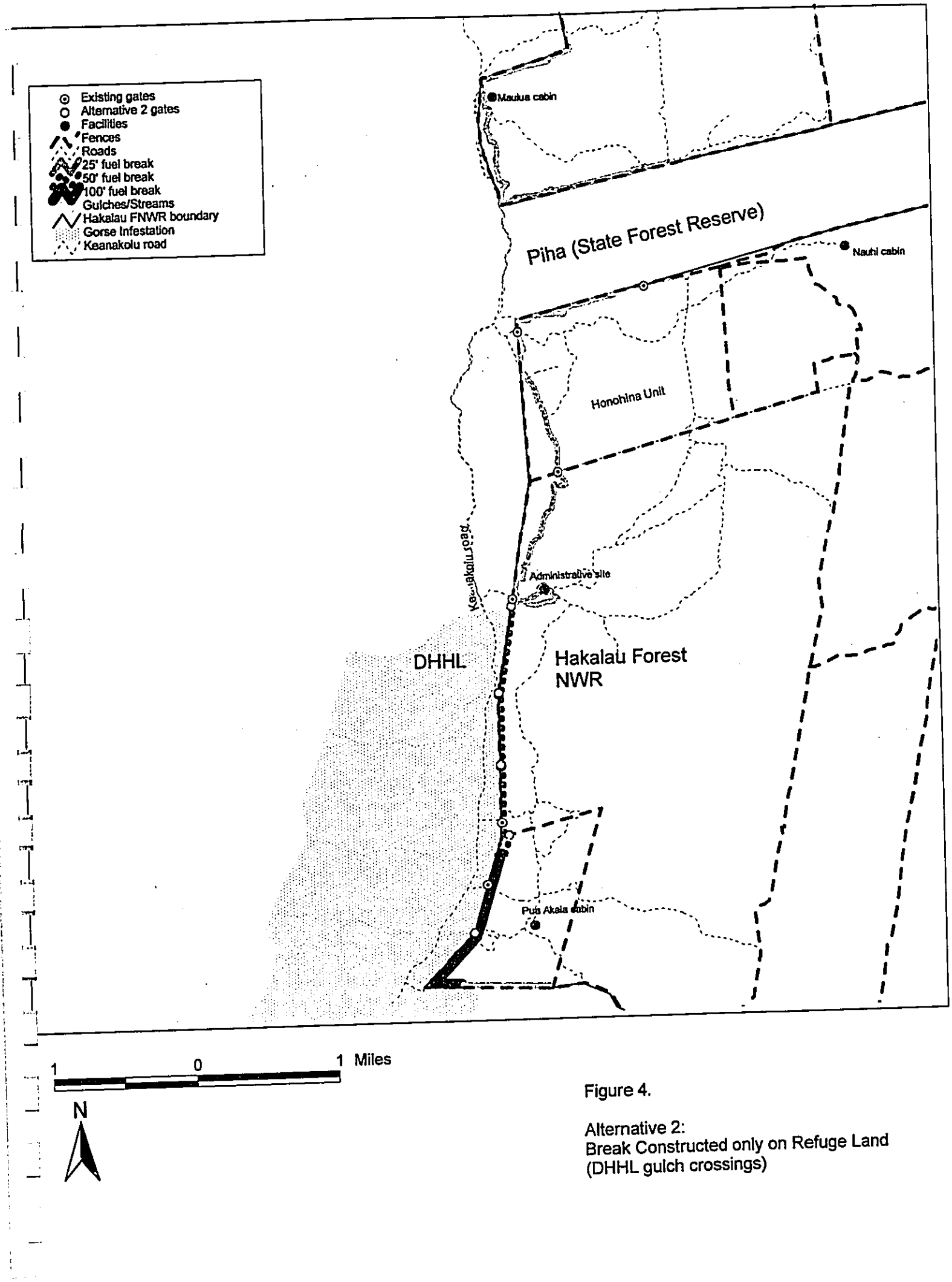


Figure 4.

Alternative 2:
Break Constructed only on Refuge Land
(DHHL gulch crossings)

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

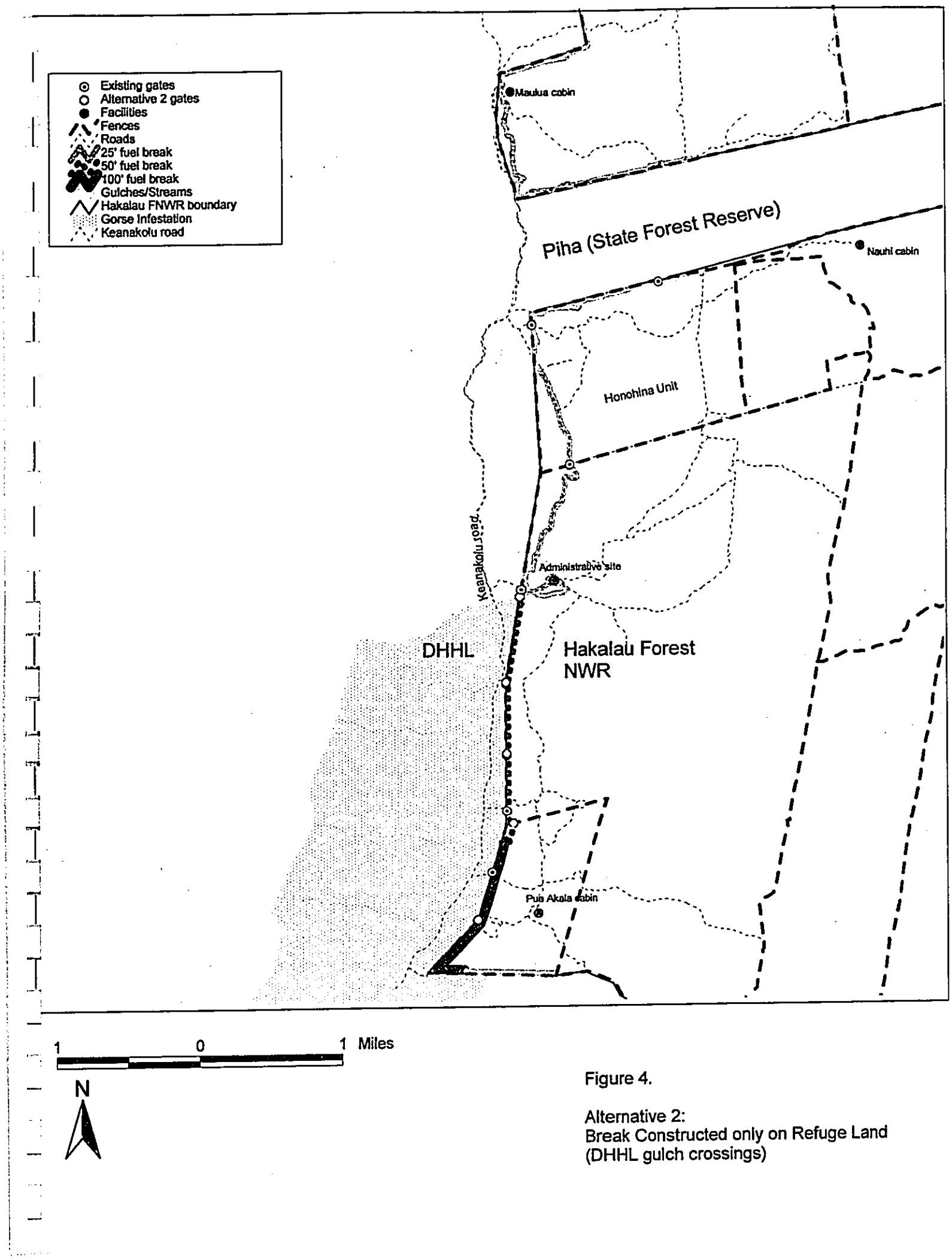


Figure 4.

Alternative 2:
Break Constructed only on Refuge Land
(DHHL gulch crossings)

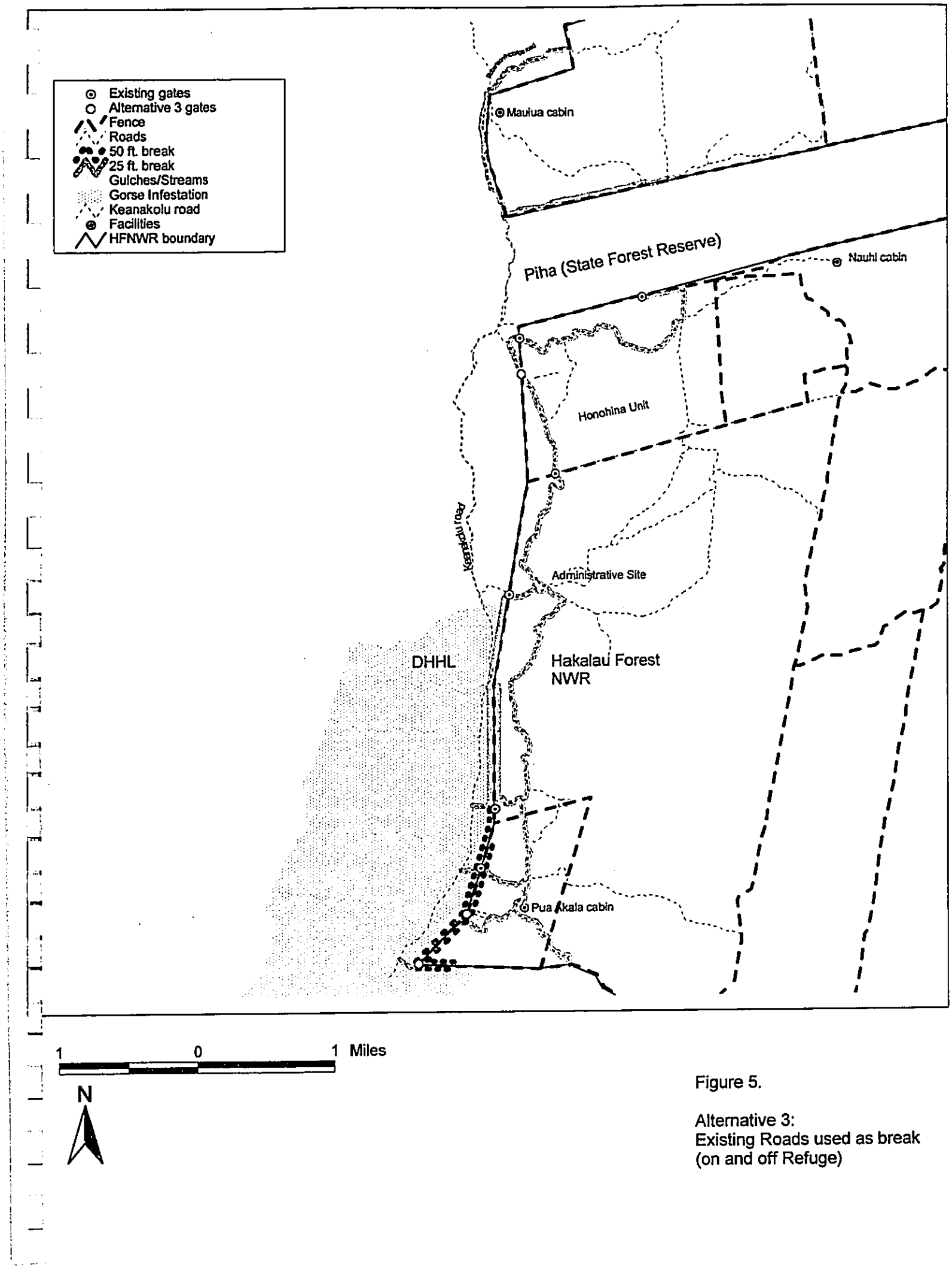


Figure 5.

Alternative 3:
Existing Roads used as break
(on and off Refuge)

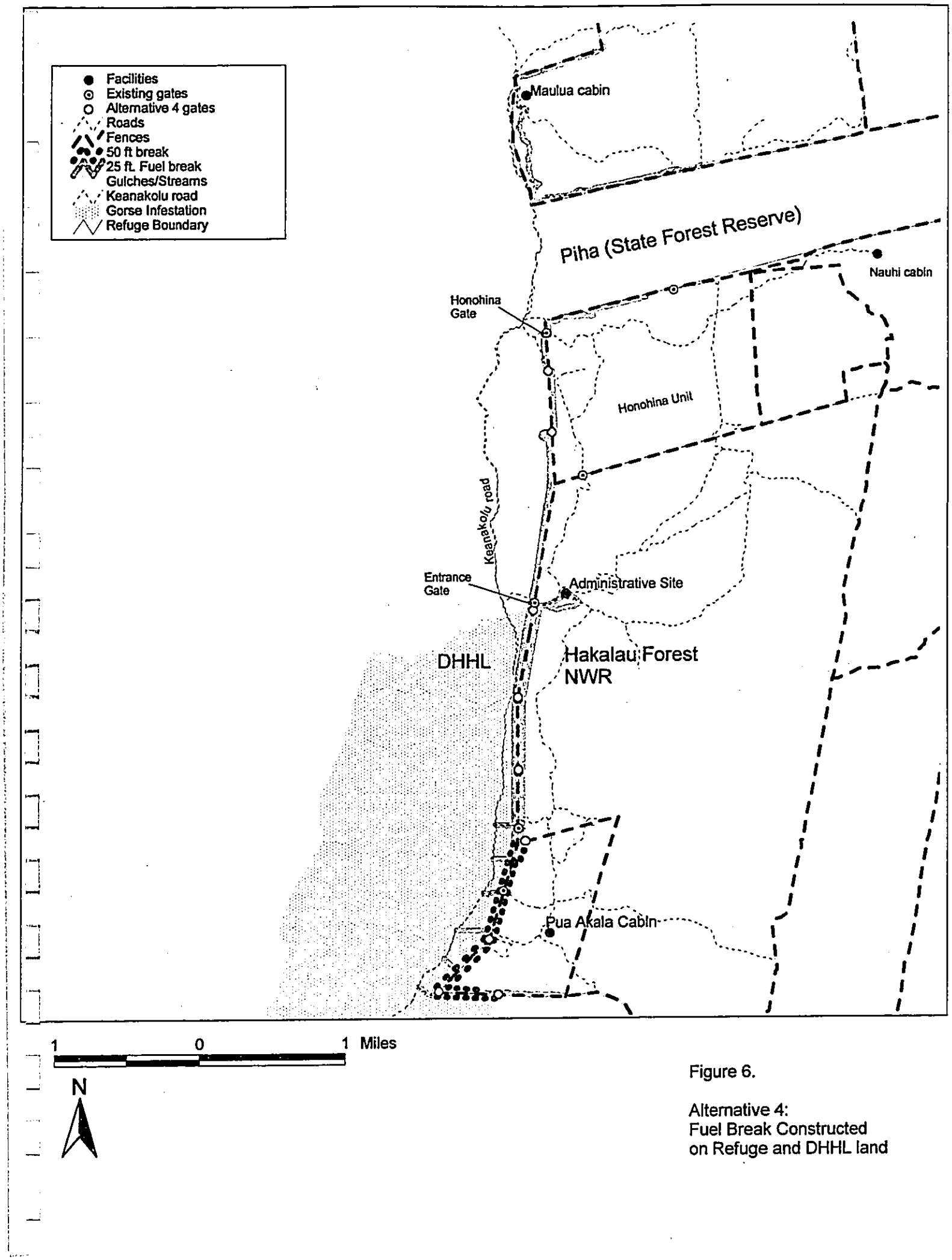


Figure 6.

Alternative 4:
Fuel Break Constructed
on Refuge and DHHL land

3. AFFECTED ENVIRONMENT

Hakalau Forest NWR is located about 14 miles northwest of Hilo, HI, on the northeast slope of Mauna Kea. (Figure 1). It lies between the elevations of 2,500'-6,600' feet and contains some of the finest stands of wet and mesic koa (*Acacia koa*) and *ohia* (*Metrosideros polymorpha*) forest remaining in Hawaii. The lower slopes receive very high rainfall (>150 inches per/yr.) and are vegetated with dense forests dominated by *ohia* and tree ferns (*Cibotium* sp.) and is bisected by numerous streams and gulches (Figure 9). Upslope, at elevations above 4,500', *koa* becomes co-dominant with *ohia*. The typical structure of this forest is characterized by tall *koa* and *ohia* trees forming a closed canopy with a native sub-canopy. Higher elevations (above 5,400') experience less rainfall (<120" inches per/yr.) and have been subject to cattle grazing pressure for well over 100 years. Native understory has been eliminated or severely reduced in this area. A fairly uniform canopy of mature *koa* and *ohia* trees over a ground cover of exotic grasses, shrubs, and scattered native shrubs characterizes this area. Intensive grazing in the uppermost portion of the Refuge (above 6,000'), has eliminated even the trees except for remnant stands and individuals scattered throughout the grasslands, and along the gulches (Figure 12).

Reforestation of the open pasture areas began 14 years ago following establishment as a National Wildlife Refuge and development of a Draft Reforestation Management Plan. To date, more than 250,000 native trees, mostly *koa*, have been planted (Figure 13). As the *koa* overstory develops, understory species and rare plants, cultivated in the Refuge greenhouse, are then planted beneath. Native tree species are slow growing and easily killed by fire during sapling stages. Some of the oldest outplanted trees now measure up to 10" dbh. (J. Jeffrey, pers. commun., 2002).

Along the westernmost boundary and immediately adjacent to the southern portion of the Refuge, the area is carpeted with gorse, a bushy alien shrub that forms impenetrable thickets. This land, owned by the Department of Hawaiian Homelands (DHHL), and leased to Parker Ranch, includes a 195 acre parcel proposed to be reforested with *koa* as part of a Cooperative effort with the U.S. Fish and Wildlife Service (Figure 8). Land ownership to the north and south of the Refuge is also by DHHL, with the exception of a 120 acre parcel owned by the George Robertson Family and Alfred Nobriga Sr. Both DHHL and Mr. Nobriga run cattle operations on their land. The State Division of Forestry and Wildlife (DOFAW) Piha tract lies between the Refuge's Maulua and Honohina units (Figure 2). This land was used historically to test a variety of exotic tree species for hardiness and is now managed primarily for hunting, gathering, and conservation. DOFAW also owns and manages the Laupahoehoe tract further north of the Refuge.

There are several groves of exotic trees, planted by private parties and later by territorial foresters from the State of Hawaii beginning in the late 1800's (Tomonori-Tuggle, 1986). Plantations occur within the upper elevations of the Refuge and contain sugi pine (*Cryptomeria japonica*), *Eucalyptus* spp. and *Pinus* spp. These plantations are small in

acreage (Rubenstein, 1995), but are beginning to spread now that cattle have been removed from the Refuge (Jeffrey, pers. commun. 2002). Coniferous trees range in height from 70-80' with trunk diameters between 15-20" dbh. Species of *Eucalyptus* are considerably taller.

3.1 PHYSICAL ENVIRONMENT

Hakalau Forest NWR is located on the windward (eastern) slope of Mauna Kea, a dormant volcano. Underlying lava flows are >10,000 years old (USGS 1996). The area is classified as a Volcanic Hazard Zone 8, on a scale from 1 (most hazardous) to 9 (UH Hilo 1998). The soils are andisols, derived from volcanic ash (UH Hilo 1998) Topography of the area is gradual (9% slope) and undulating (Figure 10).

The Hakalau Unit lies on the wet, windward side of the island, and prevailing winds at the Unit are from the SSE at approximately 5 mph. These winds can cause clouds to collect at the higher elevations of the Refuge, and it is estimated that the resulting fog drip can add as much as an additional 35% to rainfall amounts. Mean daily humidity ranges from around 70% in the winter to about 85% in the spring and summer. Typically humidity is lowest during the mid-morning and highest during the late afternoon and early evening (Appendix A).

The Refuge is veined by a number of gulches and ravines, many of which become perennial streams at lower elevations (Figure 11.) Streams flow only after heavy rains or following long periods of rain. Gulches on ranch lands west of the Refuge were filled during the past 30-50 years to create gulch crossings for ranch roads (R.Wass, pers. commun. 2002) (Figure 14). Stock ponds still hold water in various locations within the Refuge and on adjacent lands.

3.2 BIOLOGICAL ENVIRONMENT

The Refuge supports a unique native avifauna, rich in species diversity. Thirty-nine bird species have been documented including 14 endemic, 5 indigenous, and 20 alien. A number of game birds were released by the state, as part of the state's "habitat enhancement" program in the1950's and are now found throughout the Refuge and neighboring lands.

The Refuge has a number of other alien species management concerns. Ongoing priority weed eradication projects include prickly Florida blackberry (*Rubus argutus*), gorse(*Ulex europus*), English holly (*Ilex aquifolium*), and banana poka (*passiflora mollissima*).

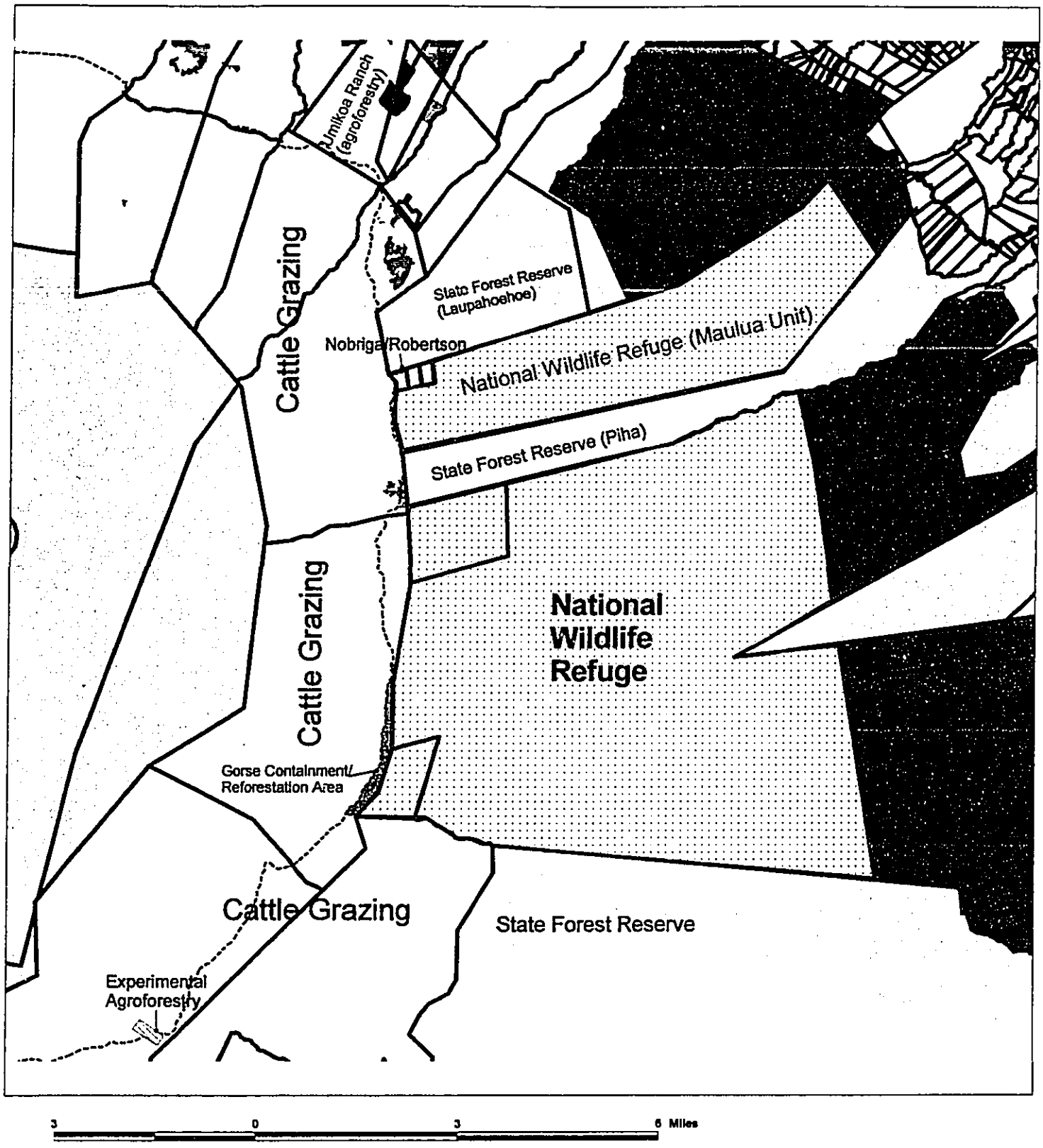


Figure 7.

Land Use in the area
of Hakalau Forest NWR

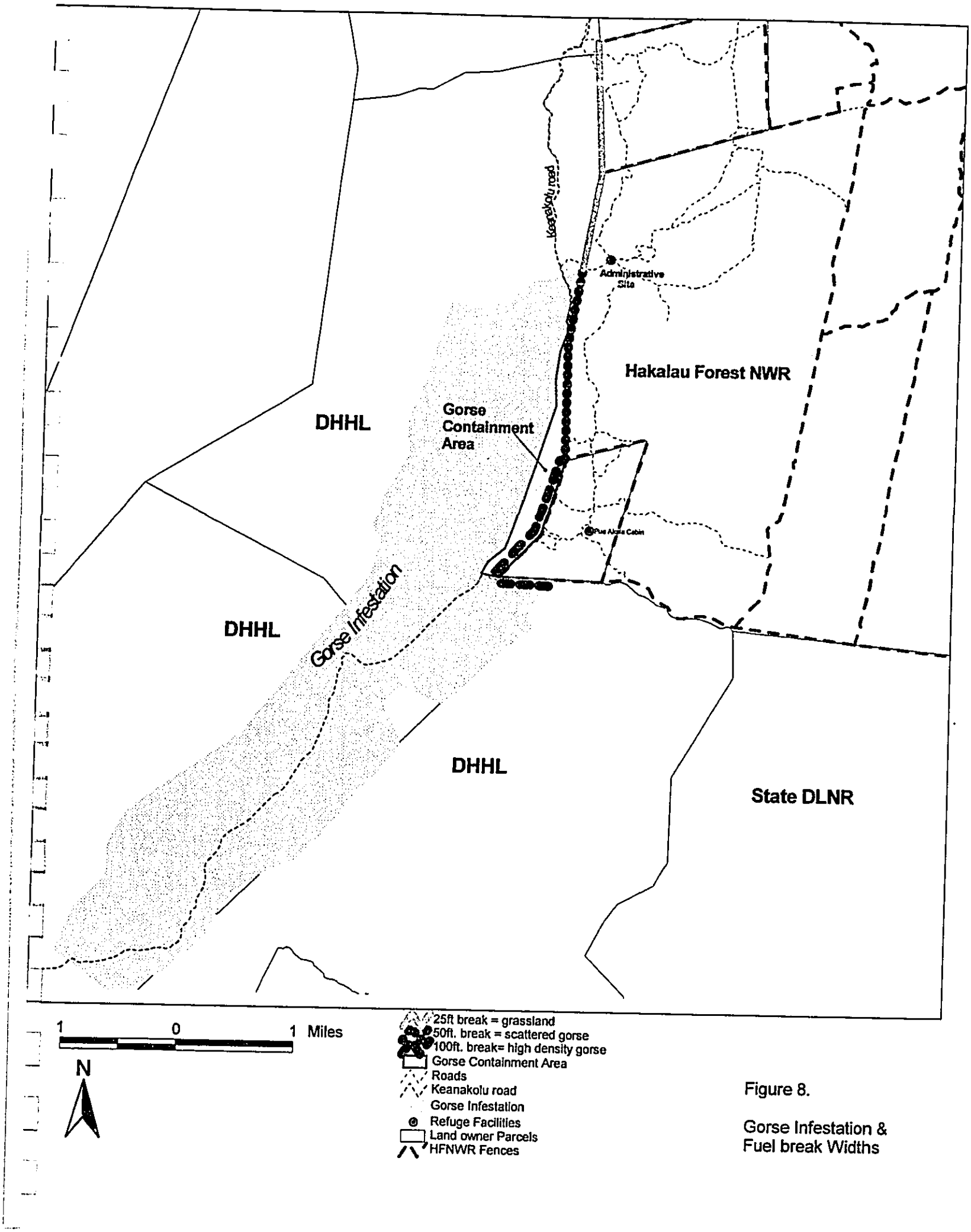
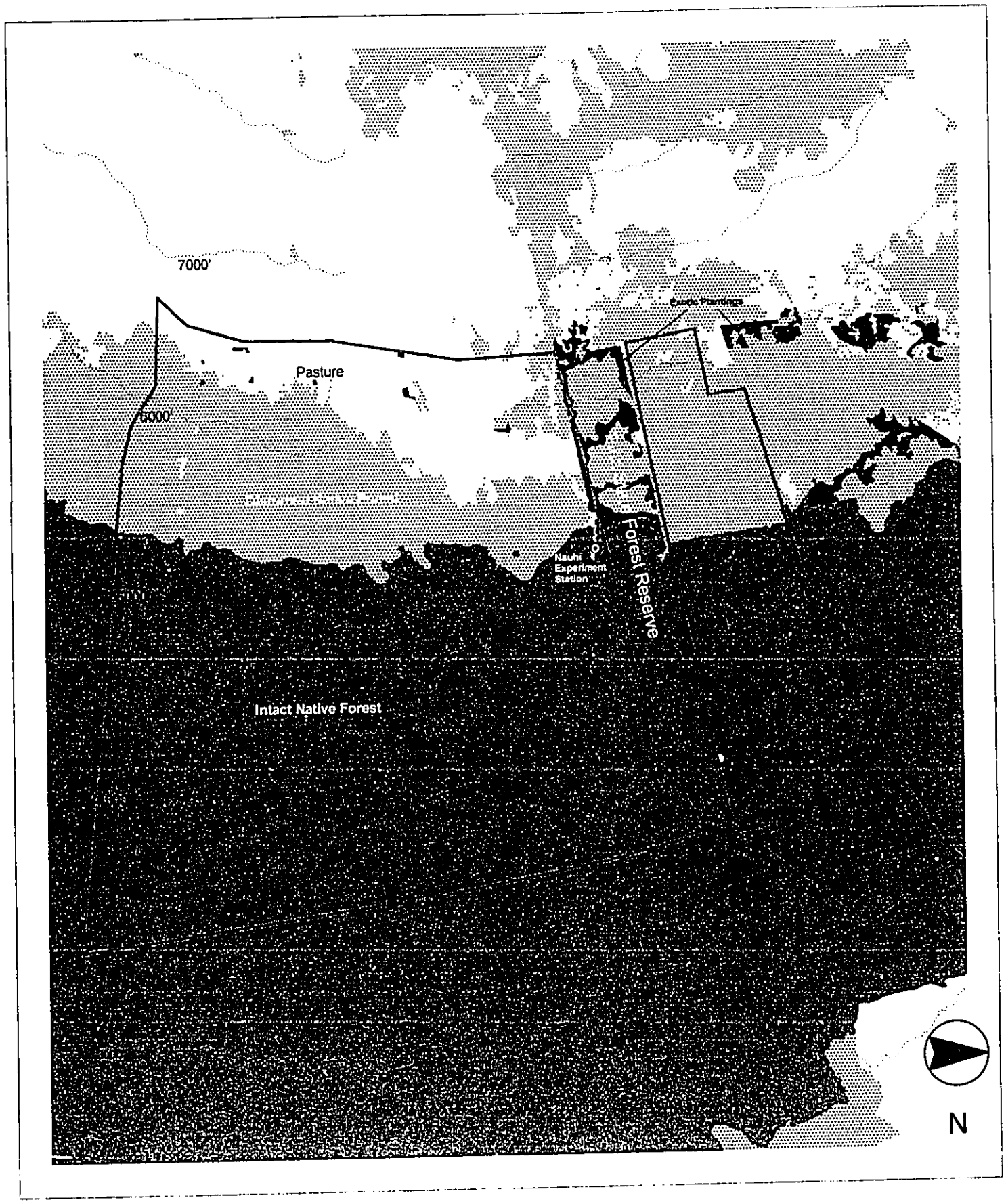


Figure 8.

Gorse Infestation &
Fuel break Widths

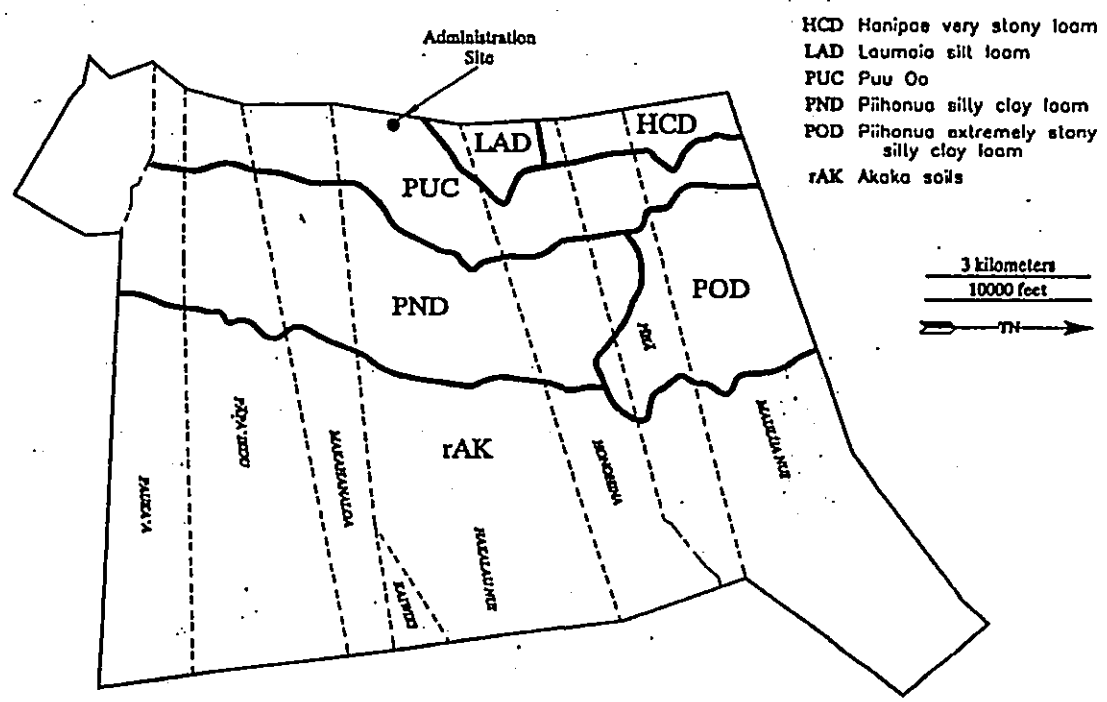
Figure 9.

Hakalau Forest NWR Vegetation Communities



From Jacobi, 1978

Figure 10. Soils of Hakalau Forest NWR (after Sato et al. 1973)



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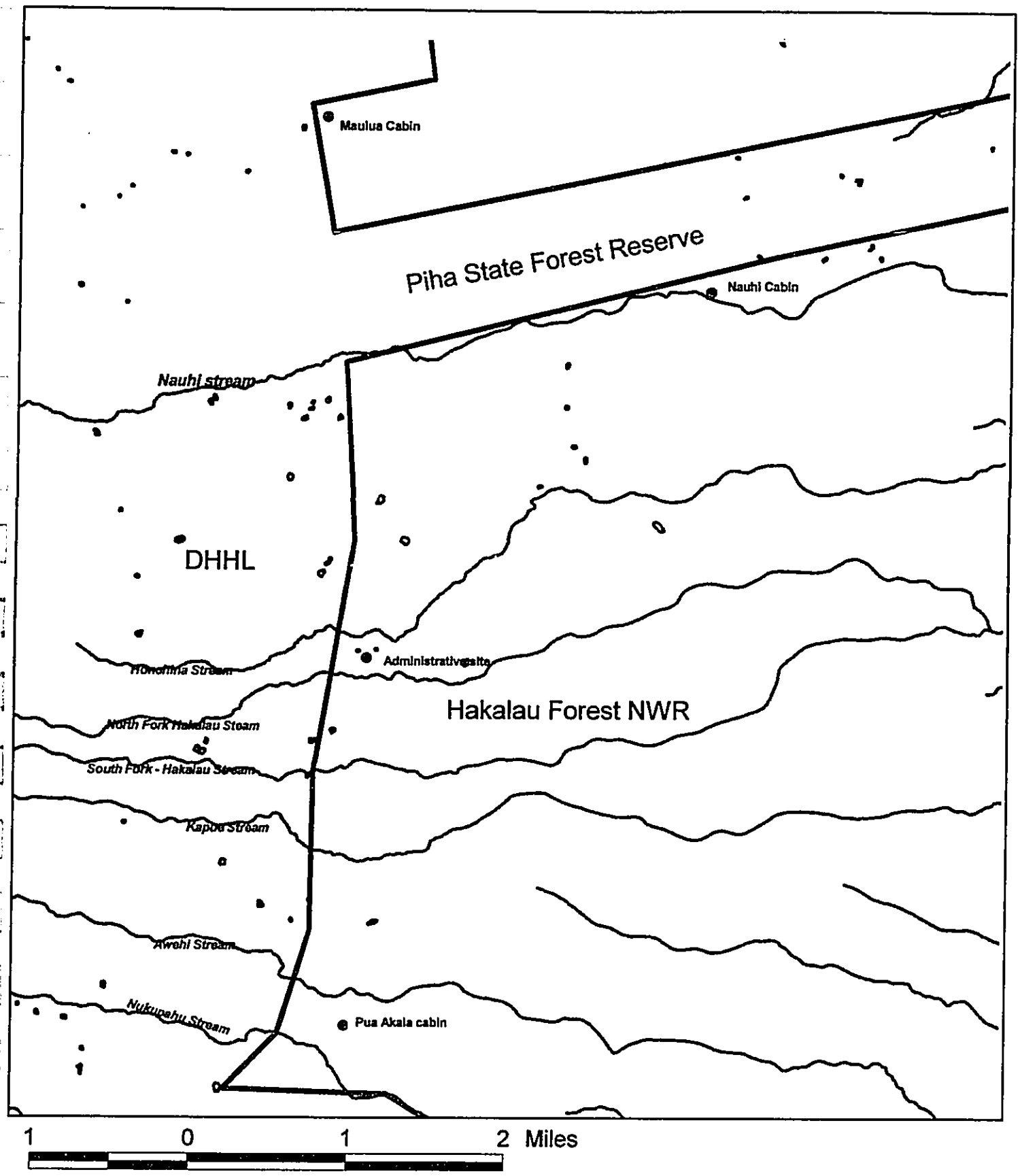

Figure 11.

Gulches and Streams
on DHHL and Refuge Lands

Figure 12. Remnant stand of native trees in pasture area at Hakalau Forest NWR

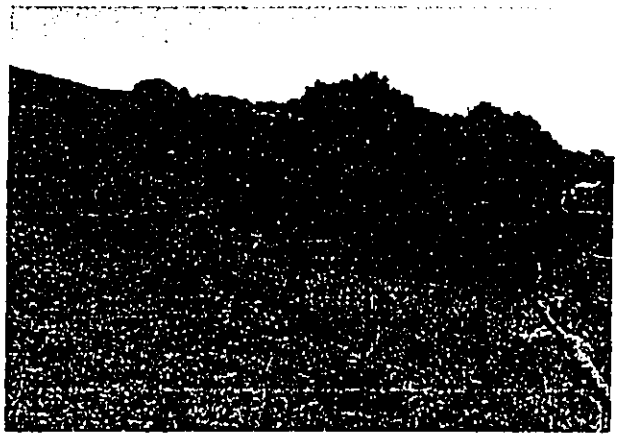

Figure 13. Recently planted koa trees on Refuge (DHHL left of fence)

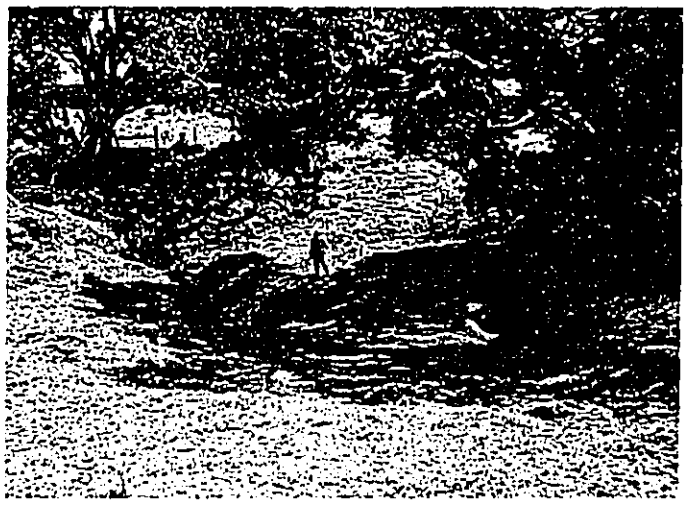

Figure 14. Existing Gulch crossing on DHHL land

Alien animals including feral pigs and cows (both European introductions), have been removed from approximately one-half of the Refuge following fencing. This has allowed forest recovery in areas previously grazed and uprooted by cattle and pig activity.

Introduced avian disease (malaria and pox virus), carried by the mosquito (*Culex quinquefasciatus*), has been found throughout most of the lowland areas, and appears to occur seasonally at Hakalau Forest NWR (LaPointe 1999). Disease carrying mosquitoes have been shown to restrict the range of native forest birds to the upper elevation areas of the island (Atkinson et al. 1993) and are known to breed in forest disturbed by cattle and pigs, where standing water collects (pig hollowed hapu'u stumps, wallows, etc.).

Alien predators including feral cats, mongoose and ship rats impact native forest bird and nene populations by preying on eggs and fledglings. Introduced game birds and rodents produce a large prey-base to support predators, adding to the problem of eradicating these species.

Endangered, Threatened, or Sensitive Species

Hakalau Forest NWR is managed primarily for five endangered forest bird species, *akiapolaau* (*Hemignathus munroi*), Hawaii *akepa* (*Loxops c. coccineus*), Hawaii creeper (*Oreomystis mana*), Hawaiian hawk (*Buteo solitarius*) and *o'u'* (*Psittirostra psittacea*), and their rainforest habitat. The endangered Hawaiian Duck (*Anas wyvilliana*) occupies small stock ponds scattered throughout the abandoned pastures.

Recently, several small flocks of *nene* or Hawaiian goose (*Branta sandvicensis*) were re-introduced to the area and occupy upper elevation abandoned pasture areas. An open-topped Nene propagation/release pen (0.25 acres) was constructed in cooperation with the Hawaii Department of Land and Natural Resources (DLNR), in 1995 near the Refuge's administrative site, and immediately adjacent to the Refuge boundary (Terry and Jeffrey 1995). The pen was constructed to facilitate reestablishment of the endangered goose to the Hakalau area.

Six plant species are listed as endangered, *Clermontia lindseyana, Clermontia pyrularia, Cyanea shipmanii, Phyllostegia racemosa, Phyllostegia velutina* and *Cyrtandra tintinnabula,* and *Clermontia peleana* are found on the Refuge. A complete list of Federally threatened and endangered species occurring on the Refuge can be found in Appendix B.

The endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) roosts and feeds within the forested area during the winter months. Bats have been seen foraging near exotic pine

plantations and may roost within the dense groves (T. Menard, Jeffrey, pers. commun. 1999).

3.3 CULTURAL ENVIRONMENT

Previous archaeological work at Hakalau Forest NWR has focused on road alignments, fence lines, quarry areas, tree planting sites, and construction locations within the upper portion of the Refuge (Carter 1990, Haun 1986, Raymond 1986 & 1989, and Rosendahl 1986, 1989-90). There are cultural and archeological sites on the Refuge of varying significance. Most are from the historic ranching era or are rock structures and boundary markers vulnerable to damage by dozer activity or intense heat. Descriptions are found in Table 2 and Figure 15. There are three cabins on the Refuge (Maulua, Nauhi, and Pua Akala cabin), two of which are being considered for the National Historic Register. One is a cabin in the Pua Akala parcel built in 1883, and the other is a cabin built in the Honohina parcel in the 1920's as a forest experiment station.

Keanakolu road is located to the west of the Refuge. Originally named Laumaia, this Hawaiian trail connected with a historic road to Waimea (Mana) (Tomonari-Tuggle 1996). The Waimea-Hamakua mountain road (now Keanakolu) was formally laid out and constructed in 1854 under government contract (Maly pers. comm. 2002, cf. letter of Metcalf & Van Houghton, Dec. 14, 1854). The present day Keanakolu road is a result of work done by the Civilian Conservation Corps (CCC) in the 1930's, and maintenance by the County of Hawaii (Tomonari-Tuggle 1996). Another road that has historic significance is a horse trail built by the CCC, which follows the path of the present day Maulua trail.

In the 1800's bullock pits were used by cattle hunters along transport roads on Mauna Kea (Tomonari-Tuggle 1996). The most famous, known as the "Doctor's Pit", and named for the botanist David Douglas, is located approximately 1 mile north of the Refuge. It is the site where Douglas was believed to have been murdered, and is now a state historic site, known as the David Douglas Monument.

An interagency agreement was made between the U.S. Fish and Wildlife Service, Hakalau Forest NWR and the National Park Service to conduct a Cultural Resource Survey of fuel break Alternatives covered in this FEA. Results are summarized in Section 3.3.1

3.3.1 Results of the Cultural Resource Survey

Five historic properties, nine features, and a series of historic fence post locations were identified as a result of the pedestrian survey of existing fence lines, roads, and cabin locations. The first two properties were an *ahu* (50-10-24-20751) on the boundary between Makahanaloa and Papaikou and a metal post associated with the historic telephone service on the Hakalau Nui portion (50-10-24-20693) both were identified by Speulda (1996). The last three properties are individual historic cabins and associated landscape features,

Table 2. **Cultural Resources in the Hakalau Forest NWR.**[1] (From Schuster et al. 2002)

Site Identification 50-10-24-	SITE TYPE	Possible Function / Date of Use or Construction	AHUPUA'A	Reference
15071	Cairn	Survey boundary marker / 19th century	Makahanaloa / Hakalua Nui	Raymond 1991
15072	Platform	Habitation / 1881	Makahanaloa	Raymond 1991
15073	Enclosure	Habitation / pre-1881	Makahanaloa	Raymond 1991
15074	Complex of four features: cairn, enclosure, two disturbed C-shapes.	Habitation / pre-1881	Hakalau Nui	Raymond 1991
18666	Pecked inscription in Hawaiian with a star design	Survey boundary marks / 1870's(?)	Makahanaloa / Hakalau Nui	Tomonari-Tuggle 1996
20693	Metal pole	Pole used to support old telephone line for service to cabins / early-20th century	Hakalau Nui	Speulda 1996
20694, 21137	Pecked initials with a triangle	Survey boundary marks / 1870's	Honohina / Hakalau Nui	Speulda 1996; Tomonari-Tuggle 1996
20695	Stacked rock wall	Possible old fence line base / 19th century	Hakalau Nui	Speulda 1996; current survey (2002)[1]
20751	Cairn	Ahupua'a boundary marker / early to mid-19th century	Makahanloa / Papaikou	Speulda 1996; current survey (2002)
21138	Possible Laumai a Road alignment	Transportation / 19th century possibly pre-contact	Above Honohina	Tomonari-Tuggle 1996
23554	Maulua cabin and Cultural Landscape	Possibly Kukuau Ranch association / Ca. 1900 (still used)	Maulua	Tomonari-Tuggle 1966; Current survey (2002)
23555	Nauhi cabin and Cultural Landscape	HSPA experiment station / 1924-1941 (still used today)	Nauhi	Current survey (2002)
23556	Pua Akala cabin and Cultural Landscape	Hitchcock family retreat / ranch headquarters / 1884 - present	Papaikou	Current survey (2002)

[1] Current Survey means work conducted by the HAVO crew (Schuster, Chattey, Tamimi and Durst).

[1] Much of the information for this Table was taken from Tomonari-Tuggle (1996:52). Speulda (1996) identified locations of interest and duplicated one of Tomonari-Tuggle's assigned site numbers. New State of Hawaii site numbers were assigned to the three historic cabins as a result of the work completed during the current survey in 2002 by the HAVO crew.

Figure 15. Cultural Resources known from previous archaeological work at Hakalau Forest NWR (Tomonari-Tuggle, 1996)

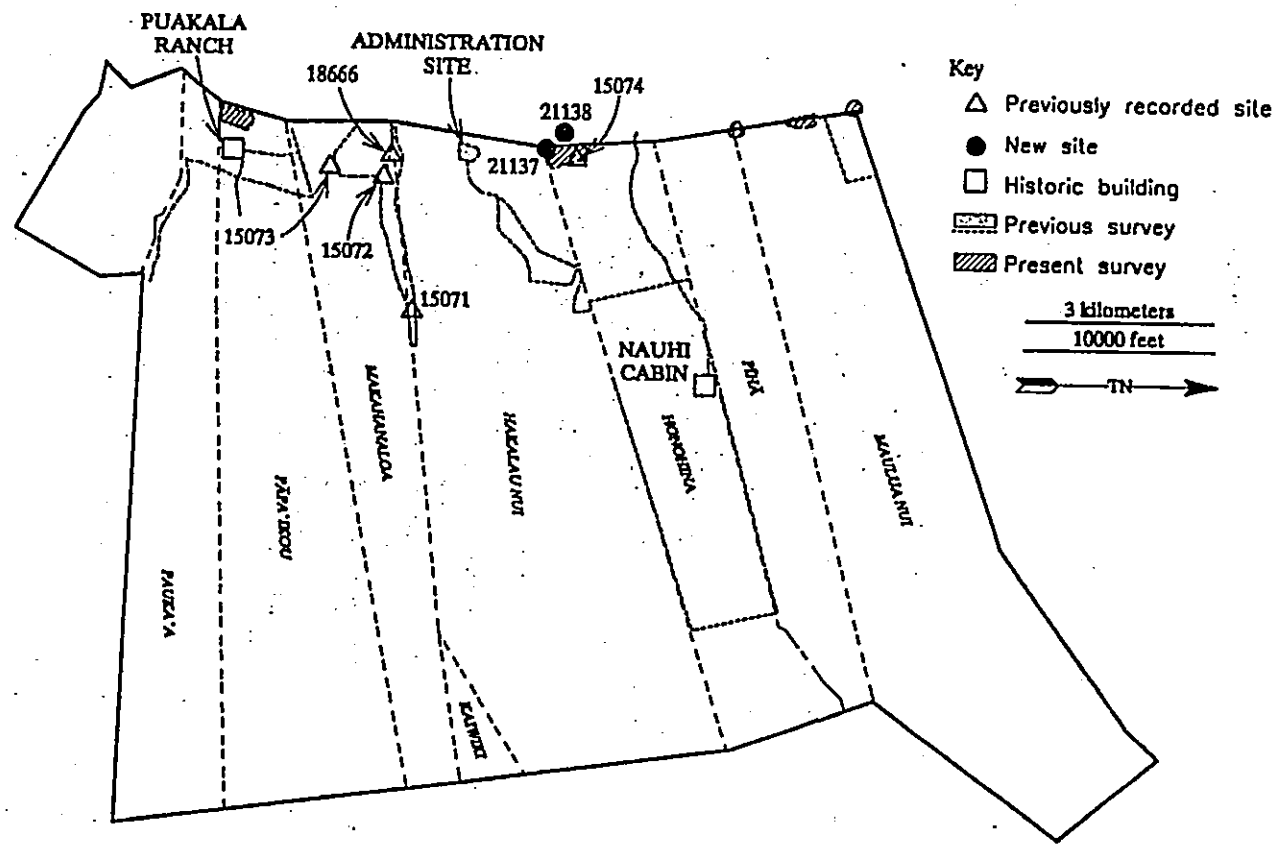

Figure 16. Pua Akala Cabin

Figure 17. Maulua Cabin

Figure 18. Nauhi Cabin

Maulua cabin in Maulua, Nauhi cabin in Honohina, and Pua Akala cabin in Papaikou (Figures 16-18). These three cabins were all identified in previous surveys. The Pua Akala Cabin has been determined to be eligible for the National Register and is considered significant as a historic property. The Nauhi cabin has been recorded and is potentially eligible for inclusion on the National Register of Historic Places because of its association with early 20th century forest management and scientific study that is unique to the Hakalau Forest area. Maulua cabin has not been evaluated, but has been documented.

A fence post and associated wall sections, jeep road, and a water reservoir are probably related to ranching activities in this area. In consultation with the USFWS Historical Archeologist, State of Hawaii site numbers are not usually assigned to the ranching features within the Refuge. This practice is due to the lack of information on specific features relating to the use of the area by ranchers. However, the locations of the ranching features have been plotted on the USGS maps for future reference. The three cabins on the other hand were assigned specific site numbers, 50-10-24-23,554 for Maulua cabin, 50-10-24-23,555 for Nauhi cabin, and 50-10-24-23, 556 for Pua Akala cabin.

The archeological resources identified during the survey did not yield any significant features and the archaeologist determined that there will be no adverse effect on any archeological resources or historic properties as a result of this action.

The archaeologist has advised that if cultural materials are discovered during brush clearing around cabins or fuel breaks, that all work will cease immediately and that the Refuge manager be notified. The Refuge manager will then contact an appropriate cultural resources specialist to determine future action.

3.3.2 Cultural Impact Assessment

3.3.2.1 Traditional Settlement and Land Use

Use of Natural Resources

Prior to the Hakalau Forest NWR, the land divisions, or *ahupua'a*, were claimed by the king and chiefs in the Mahele of 1848 (Kuykendall 1978:287). Seldom visited, except by travelers between *ahupua'a,* bird feather collectors, hunters and canoe makers, the *ahupua'a* highlands were generally undeveloped in architectural terms. The *ohia-koa* zone was used by Hawaiians for other specialized resources including bark for making fishing nets (BCB, Hawaii, A:32), and *mamake* to make *kapa* cloth (Cordy 1994:62). Hawaiians may have used the area for temporary camps while collecting natural resources or en route to a higher elevation adze quarry and associated surface work sites (Cordy 1994:87, Latinis 1997, McCoy 1985). McEldowney's (1982:1.13) research, which included *mamane* areas within the Hilo district, revealed that "native guides" for visitors in the 1800s did have

"knowledge of shelter caves, overhangs, and water sources" (Cordy 1994:86). In the dry *mamane* woodland, *pili* grass may have been collected as a special resource for thatching structures, as well as *mamane* wood for making adze handles (McEldowney 1979:32; Judd n.d., Cordy 1994:86), house posts, and *holua* sleds (Buck, 1957:83, 383, Cordy 1994:86). Within or above the *mamane* zone, the *nene* goose, petrels (*u'au*), and *koloa* duck may have been used as a source of meat (Langlas 1997). Hommon & Ahlo (1983:22) and McEldowney (1979:32-33) noted that nesting petrels were considered a delicacy restricted to chiefs, while other age ranges were available for all ranks to eat (Cordy 1994:86). Radio carbon dating of bird bones from caves located in the saddle region between Mauna Loa and Mauna Kea indicate that Hawaiians were obtaining juvenile petrels and collecting bird feathers between 1000-1450 A.D. (Langlas 1997).

The transitory nature of traditional Hawaiian use of forest areas would likely have left neither a substantial nor easily recognized archaeological record (Tomonari-Tuggle 1996). Emerson (1894:105) says only that the bird catcher "erects the necessary huts for himself and family". Pukui and Emory (1938:33,35) make no mention of shelters for canoe makers, only that a ceremonial meal preceded both the cutting of the tree and the hauling of the roughly shaped log to the coast (Tomonari-Tuggle 1996).

Traditional Use of Pigs

Polynesian pigs were used as an important source of food traditionally, and were also, according to Luomala (1960), used in sorcery and had more prestige in religion than dogs (Tomich 1986). Hawaiians were observed to keep pigs in domestication by Cook in 1785, and in 1823 Ellis observed that on Kauai "pigs were in abundance and ran without restraint about the houses"(Ellis, 1917 reprint of 1827 ed.). Ellis also noted that in the area of Kapapala, "Few Hawaiian females are without some favorite animal. It is usually a dog. Here, however, we observed a species of pet we had not seen before. It was a curly-tailed pig, about a year and a half old, three or four feet long, and apparently well fed. It belonged to two sisters of our host." Polynesian pigs were not found on the forested upper mountain slopes in pre-contact Hawaii. This occurred during the post-European contact era following further introductions of Eurasian swine and a change in traditional Hawaiian land-use practices.

Hawaiian Trails

Hawaiian trails existed in the area of Hakalau Forest NWR during the pre-contact period presumably for the purpose of accessing specialized forest and mountain resources. Boundary Commission records document numerous trails, following *ahupua'a* boundaries, from the coast to the upper edge of the forest (Tomonari-Tuggle 1996). Within these records Kalaualoha states that:

"in olden times the bird catchers used to go up the Honohina and Piha roads, they could not go up Nanue as the road was so bad. The canoe road of Nanue ran to mauka of Kaahiwa [Ka'ahina stream] , there it ended. But the roads on Honohina and Piha ran way mauka"

One prominent trail, located on the seaward side of Mauna Kea, and running parallel to the sea above the *ohia-koa* forest, connected the Kohala-Waimea-Waipi'o region to the Hilo area (McEldowney 1979:29-30, Cordy 1994:87). It was also referred to as the "mountain road" by Reverend Baldwin in an account from 1834, and as the Laumaia road mentioned in some Boundary Commission testimonies (Cordy 1994:87). This trail seems to be close to today's Mana-Humu'ula road (now Keanakolu) which was formally laid out and constructed in 1854 under government contract (Maly pers. comm. 2002, cf. letter of Metcalf & Van Houghton, Dec. 14, 1854). The original trail may have shifted in the late 1800s according to McEldowney (1982), and she speculated that short-term camps and rest areas (*o'io'ina*), shelters, water sources, and trail markers would be expected in relation to the trail. The present day Keanakolu Road probably roughly follows the Laumai'a alignment (Tomonari-Tuggle 1996). Kamakau (1961:16-17) mentions another trail connecting Kohala, Waimea, and Hamakua with Hilo, and suggests that it could be the trail used by the high chief 'Umi in his conquest of Hilo:

"It was shorter to go by way of the mountain [Mauna Kea] to the trail of Poli'ahu and Poli'ahu's spring at the top of Mauna Kea, and then down toward Hilo. It was an ancient trail used by those of Hamakua, Kohala, and Waimea to go to Hilo"

Canoe makers seem to have limited their activities to lower elevations of the forest, possibly only coming as far inland as the lowest edge of the Refuge. Koa logs were then selected, prepared and hauled down canoe roads from the lowest edge of the forest (Tomonari-Tuggle 1996). Tomonari-Tuggle (1996) also suggests (based on Boundary Commission testimony) that bird catchers ventured further up slope:

Kapou (witness for Hakalau Nui) stated that his father and uncle *"were bird catchers and used to go through the woods to the upper edge of the woods"*

McEldowney (1982: 1.6, 1.13) states that within the sub-alpine zone, landmarks would likely have been the focal points for traveling, rather than trails (Cordy 1994:87, Tomonari-Tuggle 1996).

Burials and Shrines

Boundary Commission testimonies for *ahupua'a* in the Hamakua district include references to burials on cinder cones (McEldowney 1982:A-11; Cordy 1994:87). This area seemed to be in the upper *mamane* zone or even above treeline (Cordy 1994:87). Some cinder cones mentioned in Boundary Commission testimonies include Pu'u Kalepeamoa, Pu'u Lilinoe, Pu'u Kole, Pu'u Kaupakuhale, Pu'u Kanakaleonui, Pu'u Iolehaehae, Pu'u Kihe, and Pu'u

Kea. While none of the cinder cones mentioned occurs on the Refuge, Pu'u Kanakaleonui is is located approximately 3 miles to the northwest. The intent of high elevation burials was to prevent the theft of bones. Examples of testimony includes the following:

[On "Puuokihe"]... a pile of stones on sand and aa, a burying place of Hamakua people in olden times (Kauahipaula, 1880 BCB, Hawaii, B:443)

"There are graves on Puuokihe, and also at Iolehaehae, and many other places....used to carry the body secretly and bury in the mountains (Nainoa, 1880 BCB, Hawaii, B:447).

"Formerly, when anyone died on all those lands, Kaao, Kaawikiwiki, etc. would not wail at night wrap up, and take into the mountain and bury secretly, lest the bones be used to make fish hooks (1880 testimony of Kahue, BCB, Hawaii, B:444).

The only specific historical reference to a place of worship in the area near Hakalau Forest is in Boundary Commission testimony for the Makahanaloa *ahupua'a*. Testimony from the witness Wahamu:

"Kukailimo an old rock that used to be worshiped in the woods opposite Uku [hill at 1700 ft. elevation asl]

According to Boundary Commission 36, Kukailimo is located in Wai'ama gulch (Tomonari-Tuggle 1996), *makai* of the Refuge.

Other religious use of the greater Hakalau area may have been for offerings and ceremony that were required before a particular tree could be cut for a canoe (Pukui and Emory 1938, Tomonari-Tuggle 1996). Ceremonial shrines may have been used in the Hakalau Forest NWR area, but are not mentioned in the historic record. Shrines are well documented from the Hale Pohaku, lake Waiau, and Mauna Kea summit region (McCoy 1982, Tomonari-Tuggle 1996).

Gulches

In the Laupahoehoe region well north of Hakalau Forest NWR and the Hilo District, seaward portions of gulches were known traditionally as cultural sites, where stone cairns were occasionally placed as *ahupua'a* boundary markers (Cordy, 1994:62). In Kaula gulch, near Hilo District, a *heiau* dedicated to Pele was known to exist (Ellis 1963:250), and residents of the Hamakua region were known to bring gifts of hogs, dogs, and fruit, when the priests and *kahu* of Pele assembled once per year to perform certain rites (Cordy, 1994:62). Within the lowland, sea bench area of Laupahoehoe Nui an area of agricultural use is known by a complex of platforms, taro terraces (*lo'i*) fed by canals from waterfall pools , house platforms, and a "curbed trail" (Cordy 1994:41, 48). These areas are located well to the north (Kohala) and downslope (*makai*) of the project area, but bring perspective

to the landscape and associated cultural and religious uses by Hawaiians in the pre-European period. "Kukailimo" referred to as a "place of worship" by Wahamu in Boundary Commission testimonies, is believed to occur in Wai'ama gulch at approximately the 1700 ft. elevation (Boundary Commission 36, Tomonari-Tuggle 1996). It is the only specific historical reference to a place of worship, and is located within the Makahanaloa *ahupua'a* immediately *makai* of the Hakalau Forest area (Tomonari-Tuggle 1996). Hakalau Forest NWR ranges in elevation from 2,600' - 6,600'.

3.3.2.2 Historic Land Use

Traditional land use of upland forest on Mauna Kea is believed to have rapidly declined after European contact, ending well before traditional land use practices used by Hawaiians on the lower slopes of the mountain (Cordy 1994:88).

The tradition of bird catching continued throughout the 19th century in the upland areas where bird hunters "were able to find a market for feathers even after the disappearance of traditional Hawaiian feather crafts (McEldowney 1979:42, Tomonari-Tuggle 1996). There are historical references to *kauhale*; translated as a "group of houses comprising a Hawaiian home...later used even if the home included but a single house and is sometimes used as a hamlet" (Pukui and Elbert 1971:125). Old *kauhale* are described in Boundary Commission testimony from the Palauolelo, upland Makahanaloa, Mohaluhalu, and Kulipalapala in lower Piha and Maulua Nui (Tomonari-Tuggle 1996).

Resource Extraction

Harvesting of *koa* became a commercial industry in the 1800s on the slopes of Mauna Kea and the demand for firewood increased between 1820-1870 in order to supply the whaling industry, and later sugar plantations. By 1876, recognizing that the destruction of forests had an impact on the supply of water, the "Act for the Protection and Preservation of Woods and Forests" was enacted by the King and Hawaiian legislature (Tomonari-Tuggle 1996).

Introduction of Cattle, Sheep, and Pigs to Forest Areas

In the 1880s, the *ahupua'a* in the Hakalau Forest NWR came under the ownership of sugar plantations based on the northeast Hilo coast and most of the sugar-growing activity took place at lower elevations. Cattle were introduced to Hawaii as a gift to King Kamehameha I, and left to breed in the wild under law for 10 years between 1790 and 1800. In the 1820's -1830s, bullock hunters entered the area (e.g. J.A. Simmons, J.P. Parker) and shot wild cattle which lived above the *ohia-koa* forest or woods (Cordy 1994:88). Hunting cattle for hides and meat continued through the 1900s. Sheep were introduced in the late 18th century

and in 1856 an informal sheep station was established near Humu'ula on the Mauna Kea-Mauna Loa saddle to take advantage of the feral sheep population (McEldowney 1979:38, Tomonari-Tuggle 1996). It is estimated that by the 1930s, there were 40,000 sheep around the summit of Mauna Kea (Judd 1935; Bairos 1940, Tomonari-Tuggle 1996). Cook brought English pigs on his first voyage to Hawaii (Cook 1785). Many importations followed, and in 1853 R.J. Hollingsworth made recommendations to island residents to "allow their hogs to run at large" and that if possible, "the run to comprise a ravine that abounds with wild apples, guavas, etc." Tomich (1986) suggests that such practices led to the escape of pigs into the forests and other wilderness areas. By the late 1800s it was reported the "hogs abound in the upper woods" (Bowser 1880:416) contrary to the Polynesian practice of keeping pigs near settlements. C.S. Judd (1936) also reported that ranchmen in his time or in some earlier era, purposely released imported boars of selected breeds on Mauna Kea to improve the quality of feral pigs (Tomich 1986). By the 1880s, land use in the area of Hakalau Forest NWR was divided between cattle ranching and hunting for wild cattle, pigs and sheep.

Ranching and Conservation

In the twentieth century, the land now occupied by the Hakalau Forest NWR was developed for two purposes: forest preservation and cattle ranching. The sugar plantations, desperate for water to irrigate and transport cane in flumes, needed ample supplies of water that flowed to them from the upland forests. Preservation of forests was considered essential to the success of the sugar plantations below and led to the establishment of the nearby Hilo Forest Reserve in 1905. By the 1850s cattle and sheep ranching developed as an industry on Mauna Kea. Cattle ranchers on what is now Hakalau Forest NWR, the Pua Akala Ranch, and Kukaiau (now Umikoa) Ranch, indirectly helped preserve forest lands by fencing their own lands and, by so doing, defined the boundaries of modern land use zones in the area. The Pua Akala Ranch at the southern end of the Hakalau Forest NWR was sold by the Hitchcock family to the Shipman family and served as a satellite operation for Puu Oo Ranch (Tomonari-Tuggle 1996). By the end of the 19th century Kukaiau Ranch and Puu Oo Ranch were the two major ranches in the upper Hakalau Forest area (Tomonari-Tuggle 1996). Kukaiau Ranch had two camps within the area of Hakalau Forest NWR, Spring Water and Shack Camp. The Spring Water Camp was established at the 5,000' foot level in Maulua Nui *ahupua'a* and Shack Camp was established in the Laupahoehoe *ahupua'a*. The Waimea Cattle and Grazing Company leased Humu'ula lands from Kamehameha III in 1862 and developed a sheep station at Kala'i'eha. A series of satellite ranching facilities associated with the Humu'ula operation were established sometime later at Laumaia, Hopuwai, and Keanakolu along the wagon road between Waimea and Humu'ula (Maly pers. comm. 2002). Ranching operations left a heritage of buildings and structures including the Pua Akala cabin (circa 1883), Hopuwai and Keanakolu cabins, and Spring Water Camp. Associated fence lines, water holes, and roads from this era remain in the Hakalau area to this day.

Within the Hakalau Forest NWR, the Civilian Conservation Corps (CCC) "participated in tree planting" during the 1930s (Tomonari-Tuggle 1996:44). The CCC were also involved in the construction of a sheep-proof fence on Mauna Kea as a result of grazing damage to native forests around the mountain (Bairos 1940, Tomonari-Tuggle 1996). In 1925 the Nauhi Experiment Station was established by the State Bureau of Forestry to test over 100 varieties of temperate trees and plants. The Piha tract of the Hilo Forest Reserve was planted extensively as part of a cooperative reforestation effort by Hawaii Sugar Planters Association and Territorial Foresters and later by the CCC (Tomonari-Tuggle 1996). Use of the Nauhi Experimental station continued through the 1940s. Kanakaleonui cabin was also constructed in the 1930's by the CCC.

Trails and Roads

The Waimea-Hamakua mountain road (Keanakolu) was formally laid out and constructed in 1854 under government contract (Maly pers. comm. 2002, cf. letter of Metcalf & Van Houghton, Dec. 14, 1854). The completed road was surveyed by D.H. Hitchcock in the 1870's and was used between 1874-1894 primarily as a wagon road to Humu'ula Sheep Station (*Hommon & Ahlo 1983: 28; Cordy 1994:87*). It was not until the second half of the 19th century that specific routes to the summit were established, probably related to the building and use of ranch establishments at Umikoa (Kukaiau Ranch) and Humu'ula (Humuula Sheep Station) as base camps (Tomonari-Tuggle 1996). Maly (1999) notes that traditional trails were often traveled on horseback by the late 19th and early 20th centuries. Territory of Hawaii maps from surveys done as early as 1912, indicate that the Kala'i'eha - Puu O'o- Keanakolu trail (otherwise known as the Pu'u O'o trail), passed through Puu O'o ranch (south of the refuge) and then ran parallel to the present day Keanakolu road, entering onto Refuge lands and continuing to the site of Pua Akala cabin. The trail then appears to have continued north where it passed through Hopuwai and then intersected with Keanakolu road. Other major trails used historically in the proximity of Hakalau Forest NWR were the Laupahoehoe-Waipunalei-Keanakolu- Mauna Kea summit trail, the Umikoa trail, and the Mauna Kea - Humu'ula trail. Territory of Hawaii maps from a survey done between 1912-1927 also show the Kahinahina-Kaaliali trail, connecting Laumaia with Kanakaleonui upslope (*mauka)* of the Hakalau Forest area. Oral history interviews conducted by Maly (1999) report on the use and knowledge of many of these trails by long time (*kama'aina)* residents. Interviews suggest that historic trail use included activities associated with Territorial Forestry operations, ranching, hunting and recreation, as well for spiritual purposes by priests and others traveling to Mauna Kea. Interviews also provide information on the Mauna Kea-Humu'ula trail (later the Mauna Kea road) and its use for the purpose of taking individuals ash remains to the summit of Mauna Kea for release. Through oral history accounts, Maly further documented that several trails were still traveled by interviewees in their youth, or were described by elders who still used the trails through the 1930s.

Impacts to land that would become Hakalau Forest NWR were made by the CCC in the late 1930s and early 1940s by improving portions of what is now Keanakolu Road (formerly Laumaia or Mana road), along the western boundary of the Hakalau Forest NWR. In addition, the CCC participated in trail construction and maintenance within the area now defined as Hakalau Forest NWR (Tomonari-Tuggle 1996) reestablishing a horse trail across Piha between Spring Water Camp and Honohina (Wall 1928, Tomonari-Tuggle 1996). Tomonari-Tuggle (1996) suggests that this trail may have been the predecessor of the present day Maulua trail which continues through the state owned Laupahoehoe parcel and on to Keanakolu Ranger Station.

Historic Events and Monuments

Of historic interest to the area is a memorial erected in 1934, commemorating the naturalist Dr. David Douglas in the location where he was killed in 1834. Some speculate that the naturalist was murdered, while others believe he fell into a bullock pit, commonly found on the slopes of Mauna Kea during this period, where he was trampled and gored by a wild bull. The stone cairn memorial is approximately one mile north of the Refuge's Maulua unit (Tomonari-Tuggle 1996) and is maintained by the State of Hawaii, Department of Land and Natural Resources.

3.3.2.3 **Contemporary Land Use**

Cattle Ranching

The Hakalau Forest NWR continues to have cattle ranches as neighbors to the present day. Parker Ranch and Alfred Nobriga Ranch are both working ranches in the vicinity of the Refuge. Gorse, an introduced noxious weed, is now present over a large area of grazing land owned by the State of Hawaii and leased to Parker Ranch. Experiments for removing or shading out the gorse infestation are being developed by Parker Ranch and the State Department of Hawaiian Home Lands (DHHL 2001). Oiwi-Lokahi Group, representing DHHL, proposes to continue grazing cattle in Humuula, to the south and west of the Refuge, specifically targeting areas with higher rainfall. Discussions are still underway on the issue. The draft plan calls for developing community infrastructure in the Humuula area, and subdividing existing ranch land into 100 acre "ranchettes" (Draft Humuula Master Plan 1997, Draft Oiwi-Lokahi Plan 2002), in order to provide Hawaiian families with ceded lands.

State Forest Reserves

Access to the Piha and Laupahoehoe State Forest Reserves is available via Keanakolu road, maintained by the County of Hawaii. Cultural uses within the Reserves include gathering,

hunting, ceremonial and spiritual practices, and use of historic trails. Throughout the historical period of the reserves people have gathered food, medicine, lei and cordage materials, and other non-timber forest products. Although greatly diminished, the tradition continues today. Native forests within the Forest Reserves are accessible for traditional gathering of forest resources by permit. Non-timber products are commonly collected within the exotic timber plantations as well. Some of these resources include: mosses, fruits, ti leaves, tree seedlings, *maile*, mushrooms, *hapu'u* fronds and fiber, flowers, firewood, ferns, and *liko*. Gathering of plant materials from threatened and endangered species by native Hawaiians may be allowed if individuals obtain a special permit from DLNR.

Hunting and Trails

Feral pigs, a combination of the domesticated swine of Asian ancestry brought to the islands by Polynesians, and wild boars introduced by Europeans in the late 1700's, are present throughout the forests of the Big Island. The Polynesian pig has since been absorbed or replaced by stocks of European origin (Tomich 1986). In contrast to the Hawaiian practice of keeping Polynesian pigs in lowland village areas, feral pigs are now distributed and hunted in the upland forests of the Big Island. Historically, most game mammal hunting occurred on private lands by ranchers or individuals granted permission by landowners (Maly pers. comm 2002). Public hunting now occurs within State Forest Reserves including both the Piha and Laupahoehoe parcels near Hakalau Forest NWR. Subsistence hunting is considered to be a contemporary "cultural use" and is practiced by native and non-Hawaiians. The historic Maulua trail occurs within the Laupahoehoe section of the Hilo Forest Reserve and provides access for hunting and hiking to the north of Hakalau Forest NWR. Previously the trail entered the Refuge's Maulua Unit and continued through the State owned Piha Unit. It then continued southward into the Refuge's Honohina parcel. Portions of the trail remain in the form of existing roads, but sections are now lost due to the heavy overgrowth of non-native trees and grasses, primarily within the State owned Piha unit.

Contemporary Burial/Internment Practices

Oral history interviews conducted by Maly (1999) indicate that some Hawaiian and non-Hawaiian families transport the cremated (ash) remains of their loved ones to the summit or specific Pu'u on Mauna Kea for release. Interviews also documented that some individuals have written the same wish into their own wills upon passing away. Maly (1999) notes that while cremation of remains is not a traditional Hawaiian practice, the practice of taking one's remains to special landscapes--considered to be the realm of the gods--is an ancient Hawaiian custom. While the burial of remains on Mauna Kea may no longer be feasible, the traditional practice of internment has been adapted to allow for its continuation (Maly

1999). There are no sites or *pu'u* within Hakalau Forest NWR known to be used for such internments.

Monuments and Historic Places

The only publicly known historic site from the vicinity of Hakalau Forest NWR is the previously mentioned Douglas monument, dedicated to the famous botanist Dr. David Douglas who met his demise in a wild bull pit on the slopes of Mauna Kea at the top of the Laupahoehoe section of the Hilo Forest Reserve.

The Pua Akala Cabin within Hakalau Forest NWR has recently been nominated to the National Register of Historic Places. Nauhi cabin is also a candidate for consideration to be added to the National Register.

Traditional Cultural Uses at Hakalau Forest NWR

The National Wildlife Refuge System policy for public use has been to promote high quality wildlife-dependent recreational programs when compatible with the purpose for which the Refuge was established. Wildlife dependent recreational programs will promote understanding and appreciation of natural and cultural resources and their management on all lands included in the Refuge System.

U.S. Fish and Wildlife Service Policy for Cultural Uses on National Wildlife Refuges is described under the Policy for use of Indian Sacred Sites. This policy charges Federal agencies to accommodate access to and ceremonial use of sacred sites by religious practitioners and to avoid adversely affecting the physical integrity of such sites. Under this policy it is stated that Refuges will provide Native Americans and Hawaiians reasonable access to Service managed or controlled lands and waters for exercising ceremonial, medicinal, and traditional activities recognized by the Service and by Native American and Hawaiian governments. The Service will permit these uses if activities are consistent with treaties, judicial mandates, or Federal and tribal law and are "compatible with the purposes for which the lands are managed". In practice the Refuge issues a Special Use Permit to the individuals or organizations requesting to conduct a Cultural activity (ceremony or education on traditional lifestyles, conservation, etc.) on the Refuge. The request is then reviewed by the Refuge for compatibility and legality in light of the above policy.

Proven Cultural Educational Programs occurring on mainland Refuges utilize traditional storytelling, singing, and dancing as a way of relating culture and the environment. Elders may share special knowledge about natural resources and their traditional uses, as well as sharing information about water quality, conservation and pollution.

3.3.2.4 **Historical Research**

Background literature research was completed by the author for the Cultural Impact Assessment and by Schuster et al. for the Cultural Resources Survey. Research includes existing studies by Carter (1990), Raymond (1991, 1993), Rosendahl (1989), Speulda (1996), Valentine (1996), and Latinis (1997). Other sources of information consulted includes: *A Social Impact Assessment: Indigenous Hawaiian Cultural Values of the Proposed Saddle Road Alignments* (Kanahele and Kanahele 1997), *Mauna Kea* - Kuahiwi Ku Ha'o I Ka Malie: *A Report on Archival and Documentary Research* (Maly 1998), *A Regional Synthesis of Hamakua District* (Cordy 1994), *Supplement to Archaeological, Historical, and Traditional Cultural Property Assessment for the Hawaii Defense Access Road...and Saddle Road...Project* (Langlas 1998), *Cultural Impact Assessment Study: Native Hawaiian Cultural Practices, Features, and Beliefs Associated with the University of Hawaii Mauna Kea Science Reserve Master Plan Project Area* (Rosendal 1999), *Final Cultural Resources Inventory, Evaluation, and Assessment for Proposed Improvements to Keanakolu Road, Hawaii*: Federal Highway Administration Proposed Undertaking Number HI PLH-DRP HAFO 10(1) (Williams and O'Hare 2001). The most comprehensive work done on the Cultural Resources of the Hakalau Forest NWR area to date is Tomonari-Tuggle's *Bird Catchers and Bullock Hunters in the Upland Mauna Kea Forest: A Cultural Resource Overview of the Hakalau Forest National Wildlife Refuge, Island of Hawai'i* published in 1996. Additional research conducted by Schuster was done in the Hawaiian Collection of the University of Hawaii at Hilo and included the annual reports of the Hawaii Board of Agriculture and Forestry (Division of Forestry), and the Hawaiian Sugar Planter's Association. At the Lyman Museum in Hilo, research for historic photographs and written material about the three cabins revealed that this material had been located earlier by Hakalau Forest NWR staff. Historic maps of Mauna Kea, from a private collection, were also used while researching the Cultural Impact Assessment.

3.3.2.5 **Traditional Cultural Properties**

During a previous review of the literature by Tomonari-Tuggle (1996) no Traditional Cultural Properties were identified within the Hakalau Forest NWR. Since the areas to be used for this project have already been disturbed, it is likely that there will be "no adverse effect" to any undocumented cultural properties. Native Hawaiian access and use of Hakalau Forest NWR will not change or be impacted by this project. All currently allowed activities by Native Hawaiians will continue during the course of this project.

3.3.2.6 **Hawaiian Community and Land Owner Consultation**

On September 5, 2002 Refuge Manager Dick Wass met with DHHL Land Management Administrator, Mike McElroy, and representatives Linda Chinn, Ed Andrade, and Jim

DuPont to discuss the Wildland Urban Interface Fire Program and a proposal to construct fuel breaks on Refuge and DHHL lands. Wass provided maps and outlined alternatives proposed for fuel break construction. DHHL land managers expressed their support for the project and agreed to allow portions of the fuel break to be constructed on their lands.

Early in the planning process (July 2002), letters were sent to neighboring land owners Alfred Nobriga and George Robertson. These letters (with telephone conversations in between) described the project and requested preliminary permission to construct a small portion of fuel break on their lands. The plan has since been revised and no longer includes the option of constructing a portion of fuel break along the Nobriga/Robertson fence line.

A larger group of neighboring landowners and Hawaiian groups were sent letters (and contacted via telephone) between November 26 - December 10, 2002. The purpose was to describe the scope of the fuel break project and to solicit input from individuals with special interest or knowledge of the area and to determine if there were potential conflicts regarding the proposed action. Interested individuals were invited to attend a one day site visit to the area proposed for fuel break construction. The list of individuals contacted came from recommendations by Ululani Sherlock of the Office of Hawaiian Affairs, Kepa Maly (Kumu Pono Associates), and Laura Schuster (Hawaii Volcanoes National Park). Various Hawaiian community members and organizations were contacted including: Hawaiian Civic Clubs from Laupahoehoe, Hamakua and Waimea, The Hawaiian-Environmental Alliance, Representatives from the Office of Hawaiian Affairs, Oiwi-Lokahi Group, Kahu Ku Mauna Council, The Edith Kanakaole Foundation, and Kumu Pono Associates. Neighboring landowners and representatives from Parker Ranch, Keolahou Land Trust, Nobriga Ranch, the State Division of Forestry and Wildlife and the State Historic Preservation Office were also invited to attend. Correspondence and supporting documentation are attached in Appendices C and D.

3.3.2.7 **Fuel break Site Visit**

Representatives from the Office of Hawaiian Affairs, the State Historic Preservation Division, the Hawaiian-Environmental Alliance, Kumu Pono Associates, Parker Ranch, Department of Hawaiian Home Lands, and Keolahou Land Trust, attended the one day field visit organized by staff from Hakalau Forest NWR on December 11, 2002. Individuals that expressed and interest but that could not attend include: Reynolds Kamakawiwoole, Lucille Chung (Liliuokalani Trust), Walter Victor Jr. (Hawaiian Civic Club of Laupahoehoe), Mabel Tolentino (Waimea Civic Club), and Ed Stevens (Oiwi-Lokahi Group, Kahu Ku Mauna Council).

The site visit began with Refuge and DHHL representatives explaining the need for a well maintained fuel break in habitat now invaded with exotic gorse and pasture grass. Mike

Robinson and Rebecca Alakai from the Department of Hawaiian Home Lands (DHHL) discussed a 195 acre gorse containment/koa reforestation project proposed for their lands immediately adjacent to the Refuge. Parker Ranch representative Brandi Beudet, informed the group about gorse control (including poisoning and burning) being undertaken on their lands. The group was able to view a recently burned area of gorse and then proceed to the site proposed for fuel break construction. At this time Refuge manager Dick Wass and Biologist Donna Ball described the scope of the fuel break project, findings from the Cultural Resource Survey of proposed alternatives, and presented an overview of previous archaeological investigations at Hakalau Forest NWR. Participants each received a copy of Tomonari-Tuggle's 1996 Report: *Bird Catchers and Bullock Hunters in the Upland Mauna Kea Forest: A Cultural Resource Overview of the Hakalau Forest National Wildlife Refuge, Island of Hawai'i.* Following the presentation, Refuge staff answered questions about the project from the group. Donn Carlsmith, Keolahou Land Trust, explained his goals and interest in native forest restoration for his parcel to the south of the Refuge. The group was able to view an existing gulch crossing on DHHL land and then visited the Refuge's greenhouse and observed recent outplantings of native trees on the Refuge. The final stop was at the Pua Akala Cabin, nominated for the National Historic Register. Here, Refuge Manager Wass gave an overview on the cabin's history, and explained the methods that would be used for clearing fuels (grass, brush, trees) around cabin areas.

3.3.2.8 **Comments and Concerns**

One concern expressed during the site visit was about the potential of uncovering cultural remains or features during the process of fuel break construction. Such concerns prompted a discussion about the need to have an archaeologist on-site during bull-dozing activities. The Archaeologist's recommendation to mitigate these concerns are: 1) if cultural features are unearthed, work will cease and the Refuge Manager will be contacted immediately. The Refuge manager will then contact the appropriate cultural resources specialist to review the situation and make a recommendation on how to proceed, 2) the cultural resource survey of the proposed fuel breaks would have identified the presence or absence of features (primarily *ahu* or piled stones/platforms) and that fuel break routes were also surveyed previously-- prior to heavy grass regeneration, 3) burial of human remains in the area is unlikely due to thin soils and proximity to more readily utilized *pu'u* upslope of the project area, 4) if burial had occurred along the boundary, rocks would have been placed over the remains rather than excavating a burial in thin soil, 5) piled rocks would have been readily located by archaeologists while surveying the route.

Staff from the State Division of Forestry and Wildlife were unable to attend the site visit, but did offer comments on the proposed fuel break project. They suggested that any large *koa* trees removed during the process of fuel break construction be donated to local wood workers or to school groups. Currently the Refuge is proposing to allow approximately 3-4 mature native trees (>20" diameter) to rot naturally on the Refuge, providing a substrate for

young native plants to become established. The Refuge's primary objective is protection of native species and restoration of native forest. Therefore, allowing the trees to provide nutrients for other native species is in accordance with Refuge goals. In Kanahele and Kanahele's 1997 *Social Impact Assessment - Indigenous Hawaiian Cultural Values of the Proposed Saddle Road Alignments*, they recommend that proposed actions "not disturb any *heiau*, grave sites, water sources, large or old tree stands, mountain tops, or cinder cones". The Refuge and DHHL are partnering in the fuel break project in an effort to lessen environmental impacts to gulches and tree stands. By doing so, fewer trees will be removed than if the "preferred" alternative were to occur only on Refuge lands. The Refuge plans to mitigate the removal of large trees by continuing to plant young *koa* and other native tree species. Hakalau Forest NWR has already planted over 250, 000 native trees on the Refuge. DHHL also plans to plant 195 acres in *koa* immediately adjacent to the fuel break on their lands. Indeed the purpose of the fuel break is to protect and conserve these resources in the event of fire. Kanahele and Kanahele's 1997 assessment recommends "softening or mitigating" impacts to large or old tree stands by "planting a new forest, or acquiring and dedicating other forest" (*mamane/naio* in the case of the Saddle Road Alignment) "as an extreme mitigation then accommodating the old forest as an absolute preserve is the culturally correct Hawaiian protocol that one must follow to avoid a negative cultural impact."

3.3.2.9 Cultural Impact Assessment - Summary of Consultation and Findings

Letters were sent to a number of neighboring land owners and Hawaiian community groups between Nov. 26 - Dec. 6, 2002 - as well as telephone conversations - soliciting comments on the fuel break project (Appendices C, D, and E). With the exception of concerns expressed (3.3.2.8) during the site visit, and from the State Division of Forestry and Widlife, no additiona! comments on the fuel break project were received. Following consultation with interested stakeholders and Hawaiian Community groups, a determination has been made that there will be "no adverse impacts" to cultural resources or traditional cultural properties or cultural practices as a result of this action. Residents in the area are aware of project and do not believe that the fuel break would be inconsistent culturally. Fuel breaks will protect cultural resource values, conserve native and endangered species, protect habitat in grazing areas, and safeguard neighboring landowner resources.

4. ENVIRONMENTAL CONSEQUENCES

(See 2.2 Features Common to all Alternatives)

4.1 ALTERNATIVE 1 Construct Fuel breaks on State DHHL and private lands adjacent to Hakalau Forest NWR (Fig. 3)

4.1.1 Effects on the biological environment

Lands where fuel breaks are to be constructed are already heavily disturbed (lacking native trees and animals), due to years of cattle grazing on DHHL lands. Two existing roads, Keanakolu and Robertson/Nobriga road, will be utilized as fuel breaks along the north and west boundary of the Refuge's Maulua unit. This eliminates the need to bulldoze new fuel breaks in these areas. This alternative maximizes protection of Refuge resources from fire, while minimizing biological impacts to Refuge lands. This also provides adjacent land owners with protection from fire that may originate on the Refuge. No native trees will be removed as a result of this alternative.

4.1.2 Commitment of Refuge Resources

Fuel break Maintenance

The creation of approximately 8 miles of fuel break on DHHL lands, will require the Refuge to commit resources for maintenance activities at least twice per year or as frequently as funding allows. Approximately 5 miles of the fuel break will be maintained by a combination of range disk, mowers, and herbicide spraying. The remaining portion of fuel break occurring on DHHL pasture lands, will be maintained by the existing use of cattle grazing. Portions of Keanakolu road (maintained by the County of Hawaii), and the Robertson/Nobriga road will not require further maintenance to serve as fuel breaks. With the selection of this alternative, the Refuge will need to commit at least one staff member to the maintenance of fuel breaks 6-7 weeks each year (approximately 240-280 person hours annually).This alternative requires the installation of no new gates for maintenance activities. Maintenance conducted on adjacent properties will require an agreement between the Service, State DHHL, and private land owners, George Robertson and Alfred Nobriga, Sr. For a more complete description of fuel break maintenance activities see Section 2.2.7.

4.1.3 Mitigation Measures

Mitigation measures are detailed in Section 2.2.6

4.2 ALTERNATIVE 2 Construct Fuel breaks on Refuge with gulch crossings on DHHL land (Fig. 4)

4.2.1 Effects on the biological environment

Because existing gulch crossings will be used there will be no impacts to gulches or stream beds on the Refuge. This alternative provides slightly less protection (approximately 20

acres) to Refuge resources (mainly pasture and recently planted koa trees), as the fuel break deviates from the western boundary in order to avoid gulch crossings and *koa* trees. A total of 19 native trees will be removed from the Refuge including: 2 large *koa* trees > 30" dbh, 3 native trees > 12" dbh, and 14 trees (primarily recently planted *koa*) > 4" dbh.

4.2.2 Commitment of Refuge Resources

Fuel break Maintenance

The creation of 10.6 miles of fuel breaks on Refuge lands would require resources to maintain these breaks twice per year or as frequently as funding allows. All of the fuel break will be maintained by a combination of range disk, mowers, and herbicide spraying. The Refuge will need to commit at least one staff member to the maintenance of fuel breaks 6-7 weeks each year (approximately 240-280 person hours annually). This alternative minimizes the Refuge's dependence on a long-term agreement with neighboring landowners in order to construct and maintain fuel breaks. An agreement is required between the Service and DHHL to allow access and maintenance along four gulch crossings occurring on DHHL land (west of the Refuge's upper boundary). Eight gates are required for gulch crossings, maintenance, and fire suppression activities. For a more complete description of fuel break maintenance activities see Section 2.2.7.

4.2.3 Mitigation Measures

Mitigation measures are detailed in Section 2.2.6

4.3 **ALTERNATIVE 3** Use Existing Roads/Breaks on Refuge and adjacent lands (Fig. 5)

4.3.1 Effects on the biological environment

This alternative minimizes new impacts to areas currently without roads or breaks. Potential for erosion may occur in areas where roads have previously been exposed to mineral soil, especially following heavy rains (see Section 4.3.3). Total Refuge acreage protected is 448 acres less than in Alternatives 1 and 4. Fire protection for natural resources within the Refuge will be less optimal because existing roads are not situated in the most advantageous location. Four existing gulch crossings on DHHL land will be used to avoid impacts to gulches/streambeds. No native trees (>4" dbh) will be removed to widen roads.

4.3.2 Commitment of Refuge Resources

Fuel break Maintenance

The Refuge will need to commit resources to maintain 16.2 miles of fuel break twice per year or as frequently as funding allows. Because existing roads are utilized, it is possible to clear fuels down to mineral soil, creating a greater risk of erosion (See Section 4.3.3). Fuel breaks will be maintained by a combination of mower and herbicide spraying, with periodic smoothing by bulldozer as necessary. 0.9 miles of Keanakolu road (maintained by the County of Hawaii), and 0.7 miles of the Robertson /Nobriga road will not require further maintenance. Lands surrounding these two roads are currently in cattle grazing, reducing fuel loads in the area. Another small spur road that will not require future maintenance is the Hopuwai road (0.3 miles) also on DHHL grazing land. A total of 12.6 miles will be maintained on Refuge lands and 3.3 miles on DHHL lands. With the selection of this alternative, the Refuge will need to commit at least one staff member to the maintenance of fuel breaks over a period of 3-4 weeks per/yr.(approximately 120-160 person hours annually). This alternative requires the installation of 4 gates to allow for fuel break maintenance and fire suppression where fuel breaks traverse Refuge and DHHL land. Maintenance conducted on adjacent lands will require an agreement between the Service and DHHL. For a more complete description of fuel break maintenance activities see Section 2.2.7.

4.3.3 Mitigation Measures

In order to mitigate the possibility of erosion, use of ATV and 4-WD vehicles on re-graded roads/fuel breaks will be minimized during periods of wet weather. Other mitigation measures are detailed in Section 2.2.6.

4.4 **ALTERNATIVE 4** Construct Fuel breaks on Refuge and DHHL lands (Fig. 6)

4.4.1 Effects on the biological environment

Portions of the fuel break constructed on DHHL lands have already been heavily disturbed (lacking native trees and animals), due to years of cattle grazing. Portions of existing fuel breaks on Refuge lands will also be used to minimize biological impacts. Protection to natural resources on the Refuge and neighboring lands is maximized by placement of the fuel break along the uppermost boundary. Existing gulch crossings on adjacent lands will be utilized in order to eliminate impacts to gulches and stream beds on the Refuge. This alternative requires the removal of 14 native trees > 4" dbh (primarily recently planted *koa*), three native trees > 12" dbh, and three large *koa* trees > 30" dbh, from the Refuge.

4.4.2 Commitment of Refuge Resources

Fuel break Maintenance

The creation of approximately 14.7 miles of fuel breaks, will require the Refuge to commit resources to maintain these breaks twice per year or as often as funding allows. A total of 4.2 miles of fuel break will be maintained on DHHL land, and 8.8 miles on Refuge land, by a combination of range disk, mowers, and herbicide spraying. The remaining portion of fuel break (1.7 miles) occurring on DHHL pasture lands will be maintained by the existing use of cattle grazing. This Alternative requires 12 gates to allow for traversing gulch crossings on DHHL land and to conduct maintenance activities. With the selection of this alternative, the Refuge will need to commit at least one staff member to the maintenance of fuel breaks over a period of 6-7 weeks per year (approximately 240-280 person hours annually). Maintenance conducted on adjacent lands will require an agreement between the Service and DHHL. For a more complete description of fuel break maintenance activities see Section 2.2.7.

4.4.3 Mitigation Measures

Mitigation measures are detailed in Section 2.2.6

4.5 ALTERNATIVE 5 No Action. Do not construct fuel breaks or regrade existing roads on lands within or adjacent to Hakalau Forest NWR

Selection of the No Action alternative would leave fuel conditions unchanged in the area of Hakalau Forest NWR. This will result in increased fire risk to neighboring land owners and Refuge resources.

4.5.1 Effects on the Physical environment

Volcanology, Topography, Soils, and Climate

The No Action alternative would not affect volcanology. Climate may be affected fire burned a significant portion of existing forest (e.g. watershed) on the Refuge. Soil erosion would remain at the current level and topography would not be modified by bulldozer activity.

Hydrology and Water Resources

Groundwater recharge and hydrology would not be affected. The seven major gulch crossings will not be traversed or impacted by new fuel breaks. If a fire were to ignite on

the Refuge, watershed could be altered by the loss of native forest. There is potential for fire-caused erosion to deposit silt miles away from the Refuge.

4.5.2 Effects on the social and economic environment

Population, employment and local economy

Population, employment, and local economy of the greater Hakalau Forest NWR area would remain unchanged under the No Action Alternative.

Land Use

Conservation land use within the Refuge and the state's Piha tract would remain the same over the long-term. Land use off-Refuge may or may not remain the same over the next 5-50 years. There is potential for land outside the Refuge to be subdivided into 100 acre "ranchettes"in the future (Draft Humuula/Piihonua Master Plan, DHHL 1997). There is no guarantee that adjacent lands will remain in cattle grazing for the long term. If not, there is an increased risk of fire due to grass build-up on adjacent lands following the removal of cattle. Also, fire hazard increases with more homes and human use of the area. If agroforestry is successful (DHHL *FEA Koa Salvage-Reforestation Gorse Containment Plan*, 2001) it may be expanded along other portions of the Refuge boundary. Successful trees become more valuable with age, making the risk of fire greater to the land owner's investment.

Development

Refuge development and structures currently located on DHHL and other neighboring lands would remain unchanged. There is an increased risk of fire to facilities if adequate fuel breaks are not constructed and maintained. As stated above, there is the possibility that landowners to the north and west of the Refuge may choose to convert existing cattle grazing land into 100 acre "ranchettes" in the future.

Public Use

Public use of lands adjacent to Hakalau Forest NWR is primarily by individuals accessing the state's Piha and Laupahoehoe Game Management Units for hunting, fruit picking, and other gathering activities. Other use of lands immediately adjacent to the Refuge includes; off-road recreational vehicle driving, mountain biking, and horseback riding. These activities are not expected to change under the No Action Alternative.

The Refuge's Upper Maulua Unit is open for public access year-round on weekends, and permitted ecotours occur within the Shipman and Pua Akala units. This policy would remain the same under the No Action alternative. Without adequate fuel breaks in place the Refuge would be more likely to close down the public use program during periods of drought.

Cultural Resources

Historic structures, associated outbuildings, and fence lines may be negatively impacted in the event of fire. The status of other types of cultural resources (ahu, rock walls, and boundary markers) would likely remain unchanged under the No Action alternative.

4.5.3 Effects on the biological environment

Native biodiversity

Because native forest on DHHL and neighboring lands has been greatly diminished, native species biodiversity would not likely be impacted by fire. In the event a fire burns significant acreage of native forest on the Refuge, native plant and animal diversity will likely decrease. Fire has been shown to stimulate seed germination of some native tree species (Scowcroft and Ward, 1976). However, exotic grasses have also been shown to out-compete native species following fire on the refuge, essentially shading out all other species stimulated by the burn within months (J. Jeffrey pers. commun. 2002).

Endangered, threatened or candidate species

Several endangered and threatened species will be negatively impacted if a fire burns through important/core habitat. Some species may respond positively immediately following a fire. *Nene*, for example, may benefit from the young grass shoots that normally come up after a fire. This would likely be a short-term benefit, as grass is often too tall to be useful forage for nene following a few months of vigorous growth. If large tree stands were lost in a fire, habitat would be reduced for decades as it takes *koa* and *ohia* many years to form a closed canopy. This would likely impact Hawaiian hoary bat and endangered forest bird populations.

Some species of endangered plants are found in very few locations, and in some cases are the last wild individual known. A fire may jeopardize not only wild individuals, but also the Refuge nursery where many of these species are propagated.

Harmful non-native species

Under the No Action alternative, grass and gorse distribution would remain the same or continue to increase. Gorse is fire adapted and quicky reseeds and sprouts following fire. Fire may temporarily reduce populations of blackberry, banana poka and English holly. Other alien species would likely remain the same under the No Action alternative.

4.5.4 Commitment of Refuge Resources

There would be no new commitment of Refuge resources under the No Action Alternative. Maintenance of existing fuel breaks would continue at the current level (e.g. herbicide spraying, mowing).

4.5.5 Mitigation Measures

Current mitigation measures employed by the Refuge would remain the same under the "No Action" Alternative. These include; reducing fuel build-up by mowing grass around structures within the Administrative site 6-8 times per year, mowing existing breaks/roads that occur in smooth terrain, and poisoning gorse once per year along the Refuge's southwestern flank. Fire suppression equipment available at the Refuge includes a D-4 bulldozer, fire slip-on unit (portable water tank, pump and fire hose), 10-man fire cache, and associated fire fighting gear. When mowing or weed-whacking during periods of drought, the Refuge maintains a fire engine on "stand-by". Other fire prevention measures include; 1) no parking vehicles (especially with catalytic converters) in tall, dry grass 2) providing Refuge visitors with brochures including information about fire hazards and prevention 3) restricting the use of cigarettes on the Refuge by employees, researchers, volunteers, and visitors.

Some lands outside the Refuge would remain in cattle grazing for the near-term, eliminating the build-up of dry pasture grasses north of the gorse infestation (Figure 7). Because cattle do not eat gorse, the infestation along the southwestern flank of the Refuge would likely continue to expand, increasing the area's risk of fire. The Gorse Containment /Reforestation Plan (DHHL 2001) proposed for this area (Figure 8), calls for removing cattle from a 195 acre unit and planting *koa* in order to shade-out gorse. It will take many years to accomplish this goal and regular herbicide application along the existing boundary break will be required to suppress gorse regeneration. Currently gorse seedlings and shrubs are poisoned by the Refuge maintenance crew once per year.

4.6 SUMMARY OF CONSEQUENCES OF THE ALTERNATIVES

Table 3 presents a summary of the estimated net effects of implementing the various alternatives on specific resources or issues identified. In this table, a "0" indicates that the net effect would be no change, a "-" or "–" indicates that the alternative would lead to a

negative impact on the resource or issue, a "+" or "++" indicates that the alternative would induce a positive impact on the resource or issue identified. Finally, a "+-" indicates that the alternative would result in positive and negative impacts on different aspects of the resource or issue. These estimated net effects are based on the agencies' best determination and prediction at this time, and are subject to modification if new information is obtained during the public review process.

4.6.1 Physical Environment

Impacts to the physical environment and topography of the area are not expected to be significant for any of the four alternatives. Most of the areas proposed for fuel break construction have been previously modified by existing roads, fence lines, fuel breaks, and/or by ranching activity. There may be a slight increase in the level of erosion along existing roads that are re-graded during fuel break construction as proposed in Alternative 3. Because roads have already been exposed to mineral soil, smoothing is not expected to cause a significant amount of new erosion. Erosion will be minimized by not using vehicles on such roads in periods of heavy rain. The three remaining alternatives would not require limitations on road use, and all are expected to reseed naturally following clearing. None of the alternatives are expected to cause significant impacts to the physical environment. Gulches and stream beds will not be affected by fuel breaks as all alternatives utilize existing gulch crossings.

The proposed alternatives will all provide protection to Refuge and adjacent land owner resources in the event of fire. Fuel breaks constructed on the Refuge's western boundary (Alternatives 1 and 4) provide greater fire protection to the Refuge and neighboring land owners than do those that deviate from the boundary (Alternatives 2 and 3). Fuel breaks will block fire and provide access for fire fighting equipment and manpower. Breaks also provide access for fence maintenance and other Refuge management efforts. Fuel breaks constructed along the western boundary of the Refuge are placed optimally for Refuge fence maintenance activities (Alternatives 1 and 4), whereas Alternatives 2 and 3 are not.

4.6.2 Social and Economic Environment

None of the alternatives would change the existing land use, or impact population or economic opportunities in the area. Current public use is not expected to increase as a result of fuel break construction. A well maintained access road (Keanakolu) already exists in the area and provides adequate access to the Piha and Laupahoehoe State Forest Reserves. Public use on the Refuge would not change as a result of fuel break construction. Fuel breaks will be maintained at a minimum width of 25 ft., limiting development only within the immediate path of the break. Cattle grazing on adjacent lands will assist in maintaining low fuel biomass on breaks that occur off-Refuge in pasture areas.

All of the proposed alternatives require varying degrees of cooperation with adjacent land owners. In Alternative 1, the Refuge depends entirely on the long-term cooperation of three neighboring landowners in order to create and maintain the entire length of fuel break. In Alternative 3, the Refuge maintains the majority of the fuel break, but depends on portions of of three existing roads which traverse the property of three separate landowners. The increased number of cooperating landowners may cause delays in construction or future maintenance of fuel breaks. Alternative 2 requires cooperation between the Refuge and one landowner (DHHL) in areas that traverse gulch crossings only. This allows the Refuge more security and independent ability to perform fuel break construction and maintenance at will over the long-term. Alternative 4 also requires cooperation with DHHL by utilizing portions of their land for fuel breaks as well as gulch crossings.

Cultural Resources will be protected from fire by the construction of fuel breaks and by the removal of vegetation from Refuge cabin areas. Cultural features will receive the greatest protection with Alternatives 1 and 4. Alternatives 2 and 3 provide protection to the Pua Akala, Maulua, and Nauhi cabins, but do not provide as much protection to archaeological features in the Upper Honohina unit along the western boundary. A cultural resources survey of all proposed alternatives found no new features within the areas proposed for fuel break construction. This FEA reports that the project should not result in impacts to cultural resources on the site or in the immediate area. The proposed project will enhance fire protection to Refuge and neighboring land owner cultural resources.

4.6.3 Biological Environment

The biological environment will be impacted where fuel break construction could not avoid isolated stands, or recently planted native trees on the Refuge. Alternatives 2 and 4 require the removal of approximately 20 native trees as a result of fuel break construction. Most are recently planted *koa* trees with widths from 4-8" dbh. Another 3-4 *koa* trees are >20" dbh and occur in isolated stands on the Refuge near the western fence line. Fuel breaks that utilize existing roads (Alternative 3) spare native trees at the expense of more acreage protected from fire. Alternative 1 utilizes adjacent ranch lands with no impact on native trees. Construction of all of fuel break alternatives will be limited by the *nene* and forest bird breeding seasons. Forested areas will be avoided between January-June during the forest bird breeding season. Pasture lands known to have nesting *nene* will be avoided between November-March.

4.6.7 Maintenance, Funding, and Efficiency for Fire suppression

All alternatives require funding for annual maintenance (mowing, herbicide spraying, disking) ideally conducted twice per year. Alternative 3 include portions of fuel break on the Refuge, DHHL and private land, while Alternative 1 is placed entirely on DHHL and private lands. Breaks on DHHL and private lands will be maintained by cattle grazing in

the near future with the exception of a 195 acre unit proposed for *koa* reforestation. Within the 195 acre area all alternatives require that the boundary be maintained (sprayed with herbicide) at a minimum width of 25 ft. to prevent re-establishment by gorse. Alternative 2, will not utilize cattle grazing as a passive form of fuel control because breaks occur inside the Refuge (except gulch crossings). New gates are required to traverse gulches and to conduct maintenance in three of the four fuel break alternatives. Alternative 1 requires no new gates, Alternative 3 requires four new gates, and Alternatives 2 and 4 require eight and twelve gates respectively. More gates are less efficient for fuel break maintenance activities as Refuge staff will need to lock and unlock gates repeatedly. An increased number of gates provides greater access for fire equipment and personnel in the event of fire however.

4.7 CONCLUSIONS AND RECOMMENDATIONS

This Final Environmental Assessment has examined environmental impacts associated with the U.S. Fish & Wildlife Service's proposal to construct fuel breaks within or immediately adjacent to Hakalau Forest NWR. Every phase of the proposed action, the expected consequences, and the cumulative effects of the action were considered. The overall long-term management goal of this project is protection of adjacent landowner resources as well as the Refuge's native ecosystem and watershed in perpetuity. Based on the results of the decision matrix (Table 3) the Service has selected Alternative 4, Fuel break Construction on Refuge and DHHL lands, as the preferred alternative.

Alternative 4, the preferred alternative, has several advantages. By constructing the fuel break along shared boundaries between the Refuge and DHHL it maximizes fire protection for all parties. Unlike Alternative 1, this alternative provides protection along the southwest flank of the state's Piha unit. Protection is also maximized for cultural resources located near boundaries. Working in cooperation with one landowner (DHHL), rather than three eliminates the potential for delays in implementation and future maintenance activities. Such delays may increase the chance of fire damaging resources on the Refuge and neighboring lands. The number of gates required may slow fuel break maintenance, but is outweighed by an increased ability to access areas with fire equipment. A total of 20 native trees (most of which are recently planted *koa*) will be removed by selecting this alternative. The increased advantage of maximizing fire protection as well as the Refuge's overall objective of reforesting pasture lands and conserving native forest outweighs the immediate biological impact of the loss of individual trees. Alternative 5 (the no action alternative) has the substantial disadvantage that by not constructing fuel breaks, considerable damage to adjacent ranch lands and Refuge resources could occur as a result of fire.

This FEA reports that the project should not result in significant environmental impacts to natural and cultural resources on the site or in the immediate area. The proposed project will enhance fire protection to Refuge and neighboring land owner resources.

Table 3. Decision Matrix

Summary of Effects	DHHL & Private land 1	Refuge Only 2	Existing Roads 3	DHHL/Refuge Combo. 4	No Action 5
Physical Environment	0	0	-	0	0
Fire Protection to Hakalau Forest NWR and adjacent lands	+	0	-	++	--
Social and Economic Environment					
Land Use	0	0	0	0	0
Development	0	0	0	0	0
Public Use	0	0	0	0	0
Cooperation with neighboring landowners	-	+	--	-/+	0
Cultural Resources	+	-	-	+	--
Biological Environment					
Native Biodiversity	+	-/+	+	-/+	-
Other Issues					
Maintenance & fire suppression efficiency	-	-/+	-/+	-/+	-
Commitment of funds for maintenance	+	-	0	-/+	0

4.8 STATEMENT OF COMPLIANCE

This Final Environmental Assessment was prepared in accordance with the National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.; 83 Stat. 852], as amended (NEPA). U.S. Endangered Species Act of 1973, as amended. Hawaii Environmental Impact Statement Law (HRS 343). Hawaii Endangered Species Law (HRS 195D). Hawaii Revised Statutes, Cultural Impact Assessment (HRS 343, Act 50).

5. SIGNIFICANCE CRITERIA

The proposed project is not expected to cause significant impacts to the environment, pursuant to the significance criteria established by the State of Hawaii Environmental Council (Hawaii Administrative Rules, Section 11-200-12) and discussed below; therefore, the agency expects a **Finding of No Significant Impact.**

The proposed actions do not involve an irrevocable commitment to loss or destruction of any natural or cultural resource. All actions proposed in this Final Environmental Assessment are anticipated to protect and thereby enhance natural resources within the Refuge. Cultural resources, within and adjacent to the Refuge, would also receive protection as a result of this action.

The proposed actions will not curtail the range of beneficial uses of the environment. Actions proposed are within Conservation and Agricultural Districts. Fuel breaks are proposed to protect resources within both areas so that existing land uses may be maintained and enhanced.

The proposed actions will not conflict with the State's long-term environmental policies. The proposed actions will not conflict with the environmental policies set forth in the State Plan and Chapter 344, HRS, in that the proposed management actions will not damage sensitive natural resources nor emit excessive noise or contaminants.

The proposed actions will not substantially adversely affect the economic and social welfare of the community. The proposed activities utilize a cost-effective strategy for protecting Refuge and land owner resources from the threat of fire.

The proposed actions will not substantially adversely affect the public health of the community. The proposed actions will not emit excessive noise or contaminants and will not have substantial adverse affects on public health.

The proposed actions will not involve substantial secondary impacts, such as population changes or effects on public facilities. The proposed actions will not affect any existing public recreational facilities and will not induce population growth in the area.

The proposed actions will not involve a substantial degradation of environmental quality. Utilizing the best management practices will minimize impacts to the environment during implementation of the proposed action.

The proposed actions will not have cumulative impacts or involve a commitment for larger actions. The proposed actions will not have negative cumulative impacts or involve significant commitment for larger actions.

The proposed actions will not adversely affect a rare, threatened, or endangered species, or it's habitat. Actions described will be implemented in a manner to avoid harm to any endangered plants, birds, bats, or other rare, threatened, or endangered species. Fuel breaks will provide protection to endangered species and their habitat.

The proposed actions will not substantially affect air or water quality or ambient noise levels. The project will not substantially affect air, water quality, or ambient noise levels. Fuel breaks will provide protection to the watershed.

The proposed project is not located in an environmentally sensitive area (e.g. flood plain, tsunami zone, and coastal zone). The project will occur within an upland forest area. The proposed action is in accordance with requirements of the preservation subzone.

The proposed actions will not substantially affect scenic vistas and view planes identified in county or State plans or studies. The project will not affect any of the listed sites or vistas for Hawaii.

The proposed project will not require substantial energy consumption. The affected area is not on a local power grid, and, with sources being gasoline powered, energy consumption will be minimal.

6. LIST OF PREPARERS AND REVIEWERS

Preparer
Donna Ball
U.S. Fish & Wildlife Service
Hakalau Forest NWR
32 Kinoole St., Suite 101
Hilo, HI 96720

Reviewers
Richard Wass - Refuge Manager, Hakalau Forest BINWRC
James Glynn - Deputy Manager, Hakalau Forest BINWRC
John Jeffrey - Wildlife Biologist, Hakalau Forest BINWRC
Dave Ledig - Refuge Manger, Kona Unit, Hakalau Forest BINWRC
Jeff Burgett - Wildlife Biologist, Kona Unit, Hakalau Forest BINWRC

7. CONSULTATION AND COORDINATION WITH OTHERS

The Draft EA was distributed to the following agencies, organizations, and interested parties:

7.1 Federal Agencies

U.S. Department of Agriculture

U.S. Forest Service, Pacific Southwest Research Station, Institute of Pacific Islands Forestry, Honolulu (Jack Ewel)
Natural Resources Conservation Service (Steve Skipper, Harry Toki, DC)

U.S. Department of the Interior

U.S. Fish and Wildlife Service
Field Supervisor, Pacific Islands Ecoregion, Honolulu (Paul Henson)
Project Leader, Hawaiian and Pacific Islands NWRC (Jerry Leineke)
Region 1 Fire Management Officer, Portland, Oregon (Andy Anderson)
Wildland Urban Interface Coordinator, Portland, Oregon (Bruce Babb)
Branch Chief Regional Archaeologist, Sherwood, Oregon (Anan Raymond)

U.S. Geological Survey, Biological Resources Division
Pacific Island Ecosystem Research Center, USGS, BRD, Hawaii Volcanoes National Park
NPS Fire Management Officer, Hawaii Volcanoes National Park, Hawaii (Jack Minassian)
Resources Management Division, Hawaii Volcanoes National Park (Tim Tunison)
Cultural Resources Division, Hawaii Volcanoes National Park (Laura Schuster)

Congressional Delegation

Senator Daniel K. Akaka
Senator Daniel K. Inouye
Representative Ed Case

7.2 State Agencies

Hawaii Department of Land and Natural Resources (Peter Young, Chairman)
Division of Forestry and Wildlife (Michael Buck, Administrator)
Division of Forestry and Wildlife, Hawaii District Manager (Jon Giffin)
State Historic Preservation Office (SHPO), Honolulu (Don Hibbard, Director)
Department of Hawaiian Home Lands (Micah Kane, Chairman Designate, James Dupont)
Office of Environmental Quality Control (Genevieve Salmonson, Director)
Office of Hawaiian Affairs, Hawaiian Rights Division

7.3 County Agencies

County of Hawaii, Planning Department (Chris Yuen)
County of Hawaii, Fire Department
County of Hawaii, Department of Public Works

7.4 Hawaiian Community

Kahu ku Mauna
Hawaiian-Environmental Alliance (President, Victoria Holt-Takamine)
Edith Kanakaole Foundation (Kekuhi Kanahele-Frias)
Hawaiian Civic Clubs of Laupahoehoe, Hamakua, and Waimea
Reynolds Kamakawiwoole
Kahu Ku Mauna (President, Ed Stevens)
Kepa Maly, Kumu Pono Associates

Liliuokalani Trust (Lucille Chung)
Oiwi-Lokahi Group (Ed Stevens, Dicky Nelson)
Waimea Homesteaders Association (President, Kanani Kapuniai)

7.5 Private Conservation Organizations

Earth Justice Legal Defense Fund
Sierra Club, Hawaii Chapter
The Nature Conservancy, Hawaii (Rob Shallenberger)

7.6 Private Landowners and Other Interested Parties

Alfred Nobriga, Sr.
George Robertson
Mike Robinson, HFCI
Keolahou Land Trust (Donn Carlsmith)
Parker Ranch (David Houle, Chief of Operations)
Big Island Wildfire Coordinating Group (Ed Brodie, Wayne Ching)
Dr. Leonard Freed, University of Hawaii, Manoa Campus

8. REFERENCES CITED

ACHP (Advisory Council on Historic Preservation) 1985. Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review. Washington, D.C. : Advisory Council on Historic Preservation (Draft Report, August).

Bairos, M. 1940. The CCC Clears the way. Pig Hunts, Trail Blazing, Tree Planting, Part of a Program to Save Hawaii's Hills. Honolulu Advertiser, magazine section, pp.1-2, Dec. 27.

Baldwin, D. 1832-1836 Letters. On file, Hawaii Mission Children's Society Library, Honolulu.

Boundary Commission Books (BCB). 1870s-1880s. Boundary Commission Books. 5 volumes, microfilm, on file, Archives of the State of Hawaii, Honolulu.

Buck, P. (Te Rangi Hiroa) 1957. Arts and Crafts of Hawaii. Bishop Museum Special Publications, 45.

Carter, L.A. 1990. Report on the archaeological survey of selected areas for the U.S. Fish & Wildlife Service, Hakalau Forest NWR. On file at the State Historic Preservation Office, Honolulu, Hawaii.

Cook, J. 1785. A Voyage to the Pacific Ocean. 2nd ed. Vols. 2-3. London: Hughs

Cordy, R. 1994. A Regional Synthesis of Hamakua district Island of Hawaii. Bishop Museum ms. On file, Historic Preservation Division, Department of Land and Natural Resources, State of Hawaii, Honolulu.

Ellis, W. 1917. A narrative of a tour through Hawaii, or Owhyhee: with remarks on the History, Traditions, Manners, Customs, and Language of the Inhabitants of the Sandwich Islands. Honolulu: Hawaii Gazette. (Reprint of the London 1827 edition). 367 pp.

Emerson, N.B. 1894. The Bird-Hunters of Ancient Hawaii. Hawaiian Almanac and Annual for 1895, pp. 101-111. Thos. G. Thrum, Honolulu.

Haun, A. 1986. Letter Report 291-121586, Archaeological Reconnaissance Survey of Proposed Boundary Fences and Cabin Site at Hakalau Forest NWR, Island of Hawaii. Paul H. Rosendahl, Ph.D. Inc., Kurtistown. Dec. 15.

Hollingsworth, R.J. 1853. Report of the Committee on Swine. Trans. Royal Hawaiian Agricultural Society 1 (4):74-76.

Hommon, R. and H. Ahlo. 1983. A Research Design for Archaeological studies at Pohakuloa Training Area, Island of Hawaii. Science Management Inc. ms. On file, Historic Preservation Division, Department of Land and Natural Resources, State of Hawaii, Honolulu (H-2900).

Jacobi, J.D. 1989. Vegetation maps of the upland plant communities on the islands of Hawaii, Maui, Molokai, and Lanai. Coop. Nat. Park Res. Studies Unit, Univ. of Hawaii Botany Dept. Tech. Report. #68.

Judd, C.S. n.d. Trees and Other Native Plants used by Early Hawaiians. Bishop Museum ms. Bishop Museum, Honolulu, Hawaii.

Judd, C.S. 1936. Hawaii's Forests Winning their Battle with Wild Animals: Honolulu Star Bulletin Mar. 21, 3d Sec., pp.1-7.

Kamakau, S. 1961. Ruling Chiefs of Hawaii. The Kamehameha Schools Press. Honolulu.

Kanahele P.K. and E.L H. Kanahele. 1997, A Social Impact Assessment: Indigenous Hawaiian Cultural Values of the Proposed Saddle Road Alignments. Project A-AD-6(1). Prepared by Native Hawaiian Cultural Consultants for U.S. Dept. Transportation-Federal Highways Administration.

Langlas, C. Ph.D., et al. 1997. Draft Environmental Impact Statement - Saddle Road (State Route 200) Mamalahoa Highway (State Route 190) to Milepost 6. County of Hawaii, State of Hawaii, FHWA Project No. A-AD-6(1). Technical Appendices - Volume IV Archaeological, Historic and Traditional Cultural Assessment. Prepared for U.S. Dept. of Transportation FHWA - Central Federal Lands Highway Division and Hawaii Dept. of Transportation. Paul H. Rosendahl, Ph.D., Inc., (Report No. 1522-022897). Hilo, Hawaii.

Latinis, D. Kyle. 1997. Archaeological Review and Predictive Modeling for Upland Humu'ula and Pi'ihonua Ahupua'a, Hawaii Island, Hawaii

Luomala, K. 1960a. The Native Dog in the Polynesian System of Values. In S. Diamond (editor) Culture in History: Essays in Honor of Paul Radin, pp. 190-240. New York: Columbia University Press. 1014 pp.

McCoy, P. 1982. Report 2. Archaeological Reconnaisance Survey. In Cultural Resources Reconnaisance of the Mauna Kea Summit Region, H. McEldowney and P. McCoy. Bishop

Museum ms. 110182. On file, Historic Preservation Division, Department of Land and Natural Resources, State of Hawaii, Honolulu (H-475).

Maly, K. 1998. "*Mauna Kea Kuahiwi Ku Ha'o I Ka Malie*" A Report on Archival and Historical Documentary Research; Ahupua'a of Humu'ula and Ka'ohe, Districts of Hilo and Hamakua, Island of Hawaii. Prepared by Kumu Pono Associates (Hilo) for Native Lands Institute (Hilo).

Maly K. 1999. 1999 Mauna Kea Science Reserve and Hale Pohaku Complex Development Plan Update: Oral History and Consultation Study, and Archival Literature Research. *Ahupua'a* of Ka'ohe (Hamakua District) and Humu'ula (Hilo District, Island of Hawaii (various TMK) Prepared by Kumu Pono Associates (Hilo) for Group 70 International (Honolulu). 112 pp.

Mueller-Dombois, D. 1981b. Fire in tropical ecosystems. Pages 137-176 in Fire regimes and ecosystem properties. Proceedings of the Conference. U.S. Forest Service General Technical Report WO-26.

Mueller-Dombois, D. and C.H. Lamoureux. 1967. Soil-Vegetation relationships in Hawaiian kipukas. Pacific Science 21 (2):221-243.

OEQC (Office of Environmental Quality Control, State of Hawaii). 1997. Guidelines for Assessing Cultural Impacts. Adopted by the Environmental Council; Nov.17, 1997.

Pukui, M.K. and Emory, K.P. 1938. The Canoe Making Profession of Ancient Times. Papers of the Hawaiian Historical Society No. 20.

Pukui, M.K. and S. H. Elbert. 1971: Hawaiian Dictionary: Hawaiian- English, English-Hawaiian. Honolulu: University of Hawaii Press. 188 pp.

Pukui M.K., S. H. Elbert and E.T. Mookini. 1974. Place Names of Hawaii. Honolulu: University Press of Hawaii. 289 pp.

Raymond, A.W. 1991. Cultural Resource Survey at Hakalau Forest NWR, Island of Hawaii. On file at the State Historic Preservation Office, Honolulu, Hawaii.

Raymond, A.W. 1993. Cultural Resource Survey of Selected Projects at Hakalau Forest NWR, Island of Hawaii. On file at the State Historic Preservation Office, Honolulu, Hawaii.

Rosendahl, P.H. 1986. Letter report 291-121586. Archaeological reconnaissance survey of proposed boundary fences and cabin site at Hakalau Forest NWR, Island of Hawaii. On file at State Historic Preservation Office, Honolulu, Hawaii.

Rosendahl, P.H. 1989. Letter Report 542-020889. Mauluanui fence line survey, Hakalau Forest NWR, Island of Hawaii. On file at the State Historic Preservation Office, Honolulu, Hawaii.

Rosendahl, P.H. 1990. Letter Report 840-051590. Pua Akala fence line survey, Hakalau Forest NWR, Island of Hawaii. On file at the State Historic Preservation Office, Honolulu, Hawaii.

Sato, H.H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro Jr. 1973. Soil Survey of the Island of Hawaii, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service.

Schuster, L.A. 2002. Cultural Resource Report for the Hakalau Forest National Wildlife Refuge Wildland Urban Interface Project. State Historic Preservation Office, Honolulu, Hawaii

Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology No. 9, Cooper Ornithological Society, Los Angeles, California.

Scowcroft, P.G., and H.B. Wood. 1976. Reproduction of Acacia koa after Fire. Pacific Science 30(2):177-186.

Smith,C.W., and J.T. Tunison. 1992. Fire and Alien Plants in Hawaii:Research and Management Implications. pp. 394-408. in C.P. Stone, C.W. Smith, and J.T. Tunison, eds., Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu.

State of Hawaii, Department of Hawaiian Home Lands 1997. Humuula/Piihonua Master Plan (Draft)

State of Hawaii, Department of Hawaiian Home Lands. 2001. Final EA for Koa Salvage-Reforestation and Gorse Containment Project at Humuula, Island of Hawaii.

State Division of Land and Natural Resources 1995. EA for Proposed Nene Propagation/Release Pen at Hakalau Forest National Wildlife Refuge.

Tomich, P.Q. 1986 2nd ed. Mammals in Hawaii. Bishop Museum Press. Honoulu, Hawaii. pp. 120-126.

Tomonari-Tuggle, M.J. 1996. Bird catchers and bullock hunters in the upland Mauna Kea forest: A cultural resource overview of the Hakalau Forest National Wildlife Refuge, Island of Hawaii. International Archaeological Research Institute, Honolulu.

U.S. Fish and Wildlife Service. 2002. Hakalau Forest NWR Fire Plan (Draft).

U.S. Fish and Wildlife Service. 1994. Draft Reforestation Management Plan. Hakalau Forest NWR unpublished report. Tanya Rubenstein, 1995.

U.S. Fish and Wildlife Service. 1994. EA for addition and modification of facilities at the administrative site, Hakalau Forest NWR.

Wall, Walter E. 1928. Map of the Island of Hawaii. Compiled from all available data; scale 1 inch= 20,000 feet. Hawaii Territorial Survey. December. With handwritten notations added on March 31, 1938. In the files of the Hawaii State Archives, Honolulu.

Williams, S. and C. O'hare. 2001. Final Cultural Resources Inventory, Evaluation, and Assessment for Proposed Improvements to Keanakolu Road, Hawaii: Federal Highway Administration Proposed Undertaking Number HI PLH-DRP HAFO 10(1). (Including Appendices 1-2). 75 pp.

Appendices

APPENDIX A: Hakalau Forest NWR Rainfall data 1990-1996
APPENDIX B: List of Federally Listed Species at Hakalau Forest NWR
APPENDIX C: Neighboring Land Owner and Hawaiian Community Consultation List
APPENDIX D: Cultural Impact Assessment Consultation Letters
APPENDIX E: DEA Preliminary Consultation Letters
APPENDIX F: DEA Public Comments and Agency Response Letters

Appendix A: Hakalau Forest NWR Rainfall data

Table 1: Rainfall Data for Years 1990 - 1996 at Hakalau Cabin (6,400' ft. elevation)

	1990	1991	1992	1993	1994	1995	1996
January	27.42	0.85	0.91	1.70	5.80	8.12	4.49
Feb	18.85	5.24	1.07	0.67	7.45	0.62	20.76
March	7.96	36.89	0.95	3.39	13.70	0.94	10.21
April	1.56	4.95	0.56	3.73	6.34	6.85	3.84
May	4.33	5.94	1.60	4.44	2.87	3.11	1.30
June	3.95	3.32	2.69	1.95	3.83	0.98	4.48
July	5.42	2.88	8.85	18.33	9.44	6.99	6.45
August	4.69	8.95	9.28	4.03	12.68	6.39	1.54
Sep	17.44	4.01	12.64	3.09	15.68	3.59	3.36
October	10.98	1.78	3.22	4.81	2.68	2.22	2.40
Nov	39.09	3.37	12.72	5.17	35.23	2.51	6.10
Dec	17.87	7.46	10.37	9.66	6.49	0.55	3.35
Total	159.56	85.64	64.86	46.47	122.19	42.87	68.28

Table 2: Rainfall Data For Years 1997 - 2001 at Hakalau Cabin (6,400' ft. elevation)

	1997	1998	1999	2000	2001
January	1.65	0.74	10.4	9.11	0.84
February	5.25	0.05	24.54	0.08	16.02
March	13.67	1.64	15.77	3.02	2.68
April	3.04	13.30	7.45	3.32	10.10
May	4.35	7.57	0.56	0.88	3.69
June	14.41	2.76	0.19	2.53	1.93
July	14.60	1.90	0.53	5.96	2.25
August	13.11	3.20	1.69	8.75	3.97
September	4.10	7.20	5.07	8.04	2.71
October	5.37	7.20	3.04	7.62	No data
November	5.99	7.90	2.85	17.66	No data
December	6.56	11.42	40.84	0.95	No data
Total	92.10	64.88	112.93	67.92	44.19 thru Sep.

Table 3: Rainfall data for years 1989 to 1994 at Pua Akala, Hakalau Unit (6,200' ft.elevation)

	1989	1990	1991	1992	1993	1994
January	30.75	26.81	2.39	0.65	0.57	14.32
February	5.06	21.64	3.91	0.38	1.17	9.17
March	3.10	12.77	48.42	1.42	3.25	16.37
April	15.83	2.48	9.54	2.26	6.40	6.66
May	14.28	6.03	4.24	1.99	5.33	5.13
June	7.53	6.57	4.93	4.14	3.42	7.86
July	30.51	6.97	3.50	12.96	24.44	13.51
August	4.54	6.50	13.54	8.48	5.57	16.38
Sept	6.48	16.78	2.29	16.48	4.25	17.65
October	10.13	13.06	1.79	4.69	5.81	4.96
Nov	0.72	43.37	5.56	13.95	7.00	51.1
Dec	1.22	20.97	4.80	15.21	7.60	5.54
Total	130.15	183.95	104.91	82.61	74.81	168.65

Appendix B: Hakalau Forest NWR List of Sensitive and Endangered species (10/99)

Species	Common Name	Status
Hemignathus munroi	akiapolaau	Endangered, forest bird
Loxops c. coccineus	Hawaii akepa	Endangered, forest bird
Oreomystis mana	Hawaii creeper	Endangered, forest bird
Psittirostra psittacea	ou	Endangered, forest bird
Buteo solitarius	Hawaiian hawk, io	Endangered, forest bird
Anas wyvilliana	Hawaiian duck, koloa	Endangered, duck
Branta sandvichensis	Hawaiian goose, nene	Endangered, goose
Fulica alai	Hawaiian coot, alae keokeo	Endangered, coot
Lasiurus cinereus semotus	Hawaiian hoary bat, apeapea	Endangered, bat
Asplenium schizophyllum	ncn	Species of concern, Plant
Clermontia lindseyana	oha wai	Endangered, Plant
Clermontia peleana	ncn	Endangered, Plant
Clermontia pyrularia	oha wai	Endangered, Plant
Cyanea shipmanii	haha	Endangered, Plant
Cyrtandra tintinabula	haiwale	Endangered, Plant
Eurya sandwichensis	anini	Species of Concern, Plant
Phyllostegia floribunda	ncn	Candidate 1 Species, Plant
Phyllostegia brevidens	ncn	Species of Concern, Plant
Phyllostegia racemosa	kiponapona	Endangered, Plant
Phyllostegia velutina	ncn	Endangered, Plant
Phyllostegia vestita	ncn	Species of Concern, Plant
Phytolacca sandwichensis	ncn	Species of Concern, Plant
Platydesma remyi	pilo kea	Candidate1 Species, Plant
Ranunculus hawaiensis	makou	Species of Concern, Plant

Appendix C

Hawaiian Community Consultation

- Office of Hawaiian Affairs (Ululani Sherlock) 1,2,3
- Edith Kanakaole Foundation (Kekuhi Kanahele-Frias) 1,2
- Hawaiian Civic Club of Waimea (Mabel Tolentino, President) 1,2
- Hawaiian Civic Club of Hamakua (Walter Victor Jr., President) 1,2
- Hawaiian Civic Club of Laupahoehoe (Roy Soto, President) 1,2
- Kahu Ku Mauna (Ed Stevens) 1,2
- Oiwi Lokahi Group (Ed Stevens) 1,2
- Kahu Ku Mauna (Ed Stevens, President) 1,2
- Hawaiian-Environmental Alliance (KAHEA) (Victoria Holt-Takamine, President) 1,2,3
- Reynolds Kamakawiwoole 1
- Lucille Chung (Liliuokalani Trust) 1
- Kepa Maly (Kumu Pono Associates) 1,2,3
- Waimea Homesteaders Association (Kanani Kapuni'ai) 2
- Office of Mauna Kea Management 1,2

Neighboring Landowner Consultation

- Parker Ranch (David Houle, Chief of Ranch Operations) 1,2,3
- Nobriga Ranch (Alfred Nobriga, Sr.) 1,2,3
- George Robertson 1,2,3
- Keolahou Land Trust (Donn Carlsmith) 1,2,3

State Agencies

- State Department of Hawaiian Home Land 1,2,3
- State Division of Forestry and Wildlife, Hilo Office (Jon Giffin) 1,2,3
- State Historic Preservation Division, Honolulu (Holly McEldowney) 1,3

Method of Contact

1= telephone, 2= letter, 3= meeting

Appendix D

Cultural Impact Assessment Consultation Letters

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

December 6, 2002

Ed Stevens, President
Ahahui ku Mauna
76-6335 Leone Street
Kailua-Kona, HI 96740

Dear Mr. Stevens:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL). We have been working directly with Linda Chin at DHHL and have notified Ululani Sherlock at the Office of Hawaiian Affairs (OHA) about the nature of the project.

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Staff from the Refuge and DHHL met in September to discuss four possible alternatives, all of which require some level of fuel break construction on DHHL land. At this time, the Refuge has selected alternative 4 as the "preferred" option. Our contractor and refuge staff will, therefore, need initial and long term access to DHHL property for construction and semiannual maintenance of the breaks if the action is approved.

The location and width of fuel breaks were determined by the level of hazardous fuels in the area, particularly in relation to an infestation of gorse and to open grassland on the Refuge. These areas pose the greatest fire risk to the Refuge and adjacent landowners and it is hoped that the construction of a long-lasting, regularly maintained fuel break will mitigate that risk. Areas proposed for fuel break construction have been previously modified during the development of fence lines, road beds, and by many years of ranching activity. A Cultural Resource Survey of the proposed fuel break line has been completed through the required Federal Section 106 process. It is the determination of the archaeologist who conducted these surveys that no cultural resources will be impacted as a result of this action. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

During the past 15 years the Refuge and volunteer groups have planted over 250,000 native tree seedlings (primarily koa), in former pasture lands. The risk of fire to this recovering ecosystem threatens not only common and endangered Hawaiian species, but also neighboring lands which may become the focus of reforestation efforts aimed at reducing the gorse infestation on Mauna Kea. The Pua Akala Cabin located on the Refuge, has recently been nominated to the National Historic Register and may also be impacted in the event of fire. The proposal to create fuel breaks also calls for reducing fuels around the Pua Akala, Nauhi, and Maulua cabins.

The purpose of this letter is to solicit input from you and your constituents on this project. If you are aware of individuals that may have special interest or knowledge of the Hakalau Forest NWR area, or if you know of parties that may have concerns or conflicts over the proposed action, please share their names with us. We would also like to invite those interested in learning more about the project to visit the Refuge on Dec. 11. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. Due to the remote location, the visit will take most of the day. If you would like to attend, please call me by December 9 at 933-6915. At this time we can arrange a time and place to meet, etc. Please call me if you have further questions or require more information about the project prior to the site visit.

Sincerely,

James Patrick Glynn

Richard Wass
for Refuge Manager

Enclosure: Map showing location of "preferred" fuel break at Hakalau Forest NWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

December 6, 2002

Ed Stevens
Oiwi Group
76-6335 Leone Street
Kailua-Kona, HI 96740

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The location and width of fuel breaks were determined by the level of hazardous fuels in the area, particularly in relation to an infestation of gorse and to open grassland on the Refuge. These areas pose the greatest fire risk to the Refuge and adjacent landowners and it is hoped that the construction of a long-lasting, regularly maintained fuel break will mitigate that risk. Areas proposed for fuel break construction have been previously modified during the development of fence lines, road beds, and by many years of ranching activity. A Cultural Resource Survey of the proposed fuel break line has been completed through the required Federal Section 106 process. It is the determination of the archaeologist who conducted these surveys that no cultural resources will be impacted as a result of this action. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

During the past 15 years the Refuge and volunteer groups have planted over 250,000 native tree seedlings (primarily koa), in former pasture lands. The risk of fire to this recovering ecosystem threatens not only common and endangered Hawaiian species, but also neighboring lands which may become the focus of reforestation efforts aimed at reducing the gorse infestation on Mauna Kea. The Pua Akala Cabin located on the Refuge, has recently been nominated to the National Historic Register and may also be impacted in the event of fire. The proposal to create fuel breaks also calls for reducing fuels around the Pua Akala, Nauhi, and Maulua cabins.

The purpose of this letter is to solicit input from you and your constituents on this project. If you are aware of individuals that may have special interest or knowledge of the Hakalau Forest NWR area, or if you know of parties that may have concerns or conflicts over the proposed action, please share their names with us. We would also like to invite those interested in learning more about the project to visit the Refuge on Dec. 11. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. Due to the remote location, the visit will take most of the day. If you would like to attend, please call me by December 9 at 933-6915. At this time we can arrange a time and place to meet, etc. Please call me if you have further questions or require more information about the project prior to the site visit.

Sincerely,

James Patrick Glynn

Richard Wass
for Refuge Manager

Enclosure: Map showing location of "preferred" fuel break at Hakalau Forest NWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

December 6, 2002

Kanani Kapuni'ai
Waimea Homesteaders Association
P.O. Box 6753
Kamuela, Hawaii 96743

Dear Ms. Kapuni'ai:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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The purpose of this letter is to solicit input from your office and constituents on this project. If you are aware of individuals that may have special interest or knowledge of the Hakalau Forest NWR area, or if you know of parties that may have concerns or conflicts over the proposed action, please share their names with us. We would also like to invite those interested in learning more about the project to visit the Refuge on Dec. 11. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. Due to the remote location, the visit will take most of the day. If you would like to attend, please call me by December 9 at 933-6915. At this time we can arrange a time and place to meet, etc. We are sorry for the short notice on this and will try to contact you by telephone to find out if you are interested. Please call me if you have further questions or require more information about the project prior to the site visit.

Sincerely,

James Patrick Glynn

Richard C. Wass
for Refuge Manager

Enclosures: Map showing location of "preferred" alternative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Don Carlsmith
P.O. Box 656
Honolulu, HI 96809

Dear Mr. Carlsmith:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statues, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts. Both are nearing completion, and will be available for public review and comments shortly.

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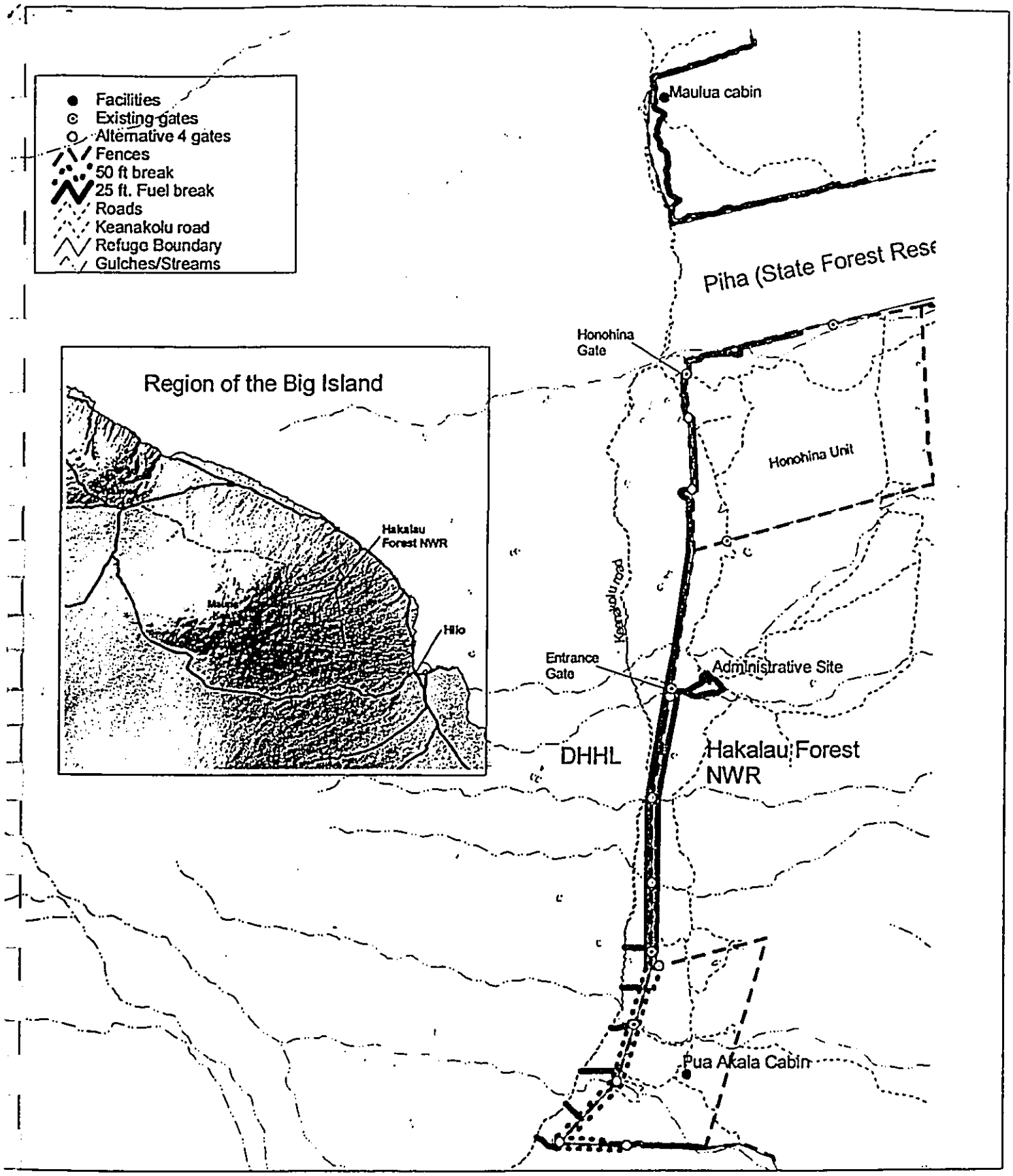
We are inviting cooperators, neighboring landowners, Hawaiian groups, and other interested parties, for a site visit to the Refuge on December 11, 2002. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. If you would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C Wass

Richard C. Wass

Enclosure: Map showing location of "preferred" alternative



Alternative 4:
Refuge/DHHL Combination

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Kepa Maly
Kumu Pono Associates
554 Keonaona Street
Hilo, Hawaii 96720

Dear Mr. Maly:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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The purpose of this letter is to solicit input from your office and constituents on this project. If you are aware of individuals that may have special interest or knowledge of the Hakalau Forest NWR area, or if you know of parties that may have concerns or conflicts over the proposed action, please share their names with us. We would also like to invite those interested in learning more about the project to visit the Refuge on Dec. 11. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. Due to the remote location, the visit will take most of the day. If you would like to attend, please call me by December 9 at 933-6915. At this time we can arrange a time and place to meet, etc. Please call me if you have further questions or require more information about the project prior to the site visit.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosures: Map showing location of "preferred" alternative

Letter sent to:

Bill Stormont, Ahahui ku Mauna
Victoria Holt-Takamine, KAHEA
Ululani Sherlock, Office of Hawaiian Affairs
Kekuhi Kanahele-Frias, Edith Kanakaole Foundation
Roger Soto, President HCC of Hamakua
Water Victor, Jr., President, HCC of Laupahoehoe
Mrs. Mabel Tolentino, President HCC of Waimea
Ed Stevens, President, Oiwi Group

Letter of invitation also sent to:

Linda Chin, Department of Hawaiian Home Lands
Jon Giffin, State Division of Forestry and Wildife
David Houle, Chief of Ranch Operations, Parker Ranch
Alfred Nobriga, Sr., Nobriga Ranch
George Robertson

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Victoria Holt-Takamine
Mauna Kea Anaina Hou - KAHEA
The Hawaiian-Environmental Alliance
P.O. Box 27112
Honolulu, Hawaii 96827-0112

Dear Ms. Takamine:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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The purpose of this letter is to solicit input from your office and constituents on this project. If you are aware of individuals that may have special interest or knowledge of the Hakalau Forest NWR area, or if you know of parties that may have concerns or conflicts over the proposed action, please share their names with us. We would also like to invite those interested in learning more about the project to visit the Refuge on Dec. 11. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. Due to the remote location, the visit will take most of the day. If you would like to attend, please call me by December 9 at 933-6915. At this time we can arrange a time and place to meet, etc. Please call me if you have further questions or require more information about the project prior to the site visit.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosures: Map showing location of "preferred" alternative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Edith Kanakaole Foundation
Kekuhi Kanahele-Frias
1550 Kalanianaole Avenue
Hilo, HI 96720-4212

Dear Ms. Kanahele-Frias:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosures: Map showing location of "preferred" alternative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Ahahui ku Mauna
Office of Mauna Kea Management
Bill Stormont
University of Hawaii, Hilo
200 W. Kawili Street
Hilo, Hawaii 96720

Dear Bill:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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Historic Register and may also be impacted in the event of fire. The proposal to create fuel breaks also calls for reducing fuels around the Pua Akala, Nauhi, and Maulua cabins.

We are inviting cooperators, neighboring landowners, Hawaiian groups, and other interested parties, for a site visit to the Refuge on December 11, 2002. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. If you or a member of your staff would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosures: Map showing location of "preferred" alternative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

David Houle, Manager
Parker Ranch
67-1435 Mamalahoa Hwy.
Kamuela, HI 96743

Dear Mr. Houle:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with Alternative 4 currently being the Refuge's "preferred" option.

The location and width of fuel breaks were determined by the level of hazardous fuels in the area, particularly in relation to an infestation of gorse on DHHL land and to open grassland on the Refuge. These areas pose the greatest fire risk to the Refuge and adjacent landowners and it is hoped that the construction of a long-lasting, regularly maintained fuel break will mitigate that risk. Areas proposed for fuel break construction have been previously modified during the development of fence lines, road beds, and by many years of ranching activity. A Cultural Resource Survey of the proposed fuel break line has been completed through the required Federal Section 106 process. It is the determination of the archaeologist who conducted these surveys that no cultural resources will be impacted as a result of this action. Under Hawaii Revised Statutes, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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The purpose of this letter is to inform you about the proposed fuel break project and to solicit your input as a neighbor of the Refuge. The Draft Environmental Assessment and a Cultural Impact Assessment (required by the State of Hawaii) are nearing completion, and will be available for public review and comments shortly.

We are inviting interested parties to the Refuge on December 11, 2002 for a site visit. If you would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosure: Map showing location of "preferred" fuel break at Hakalau Forest NWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Ed Stevens, President
Oiwi Group
P.O. Box 437342
Kamuela, HI 96743

Dear Mr. Stevens:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL). We have been working directly with Linda Chin at DHHL and have notified Ululani Sherlock at the Office of Hawaiian Affairs (OHA) about the nature of the project.

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Staff from the Refuge and DHHL met in September to discuss four possible alternatives, all of which require some level of fuel break construction on DHHL land. At this time, the Refuge has selected alternative 4 as the "preferred" option. Our contractor and refuge staff will, therefore, need initial and long term access to DHHL property for construction and semiannual maintenance of the breaks if the action is approved.

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Sincerely,

Richard C. Wass

Richard C. Wass
Refuge Manager

Enclosure: Map showing location of "preferred" fuel break at Hakalau Forest NWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 22, 2002

Ululani Sherlock
Office of Hawaiian Affairs
101 Aupuni Street, Suite 209
Hilo, Hawaii 96720

Dear Ms. Sherlock:

I write this letter to inform you of a proposed undertaking being developed by the U.S. Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge and the State Department of Hawaiian Home Lands (DHHL).

The Refuge is proposing to create fuel breaks along the uppermost, fire prone areas of the Refuge and is in the process of writing a Draft Environmental Assessment to address potential Environmental Impacts of fuel break construction on lands within and immediately adjacent to the Refuge (DHHL lands). Four potential alternatives have been identified, with alternative 4 currently being the Refuge's "preferred" option. Under Hawaii Revised Statues, Act 50 a Cultural Impact Assessment (CIA) is also being prepared to address potential Cultural Impacts.

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Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Enclosure: Map showing location of "preferred" fuel break at Hakalau Forest NWR

cc: Walter Victor, Jr., President HCC of Laupahoehoe
Mrs. Mabel Tolentino, President HCC of Waimea
Roger Soto, President HCC of Hamakua

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 25, 2002

Alfred Nobriga
P.O. Box 401
Kamuela, HI 96743

Dear Freddy:

I write this letter to further inform you of a proposal being developed by the U.S. Fish and Wildlife Service and the State Department of Hawaiian Home Lands (DHHL) to create fuel breaks along the uppermost, fire prone areas of Hakalau Forest NWR. Funding for fuel breaks comes from the Wildland Urban Interface Fire Program.

If you recall, we discussed the project in July of this year. Originally we requested permission to construct a portion of fuel break on the Nobriga/Robertson side of the Upper Maulua boundary. On July 5, 2002, we sent a letter thanking you for granting us preliminary permission to construct the break, but after consultation with our bulldozer contractor, we decided it was more feasible to construct the fuel break on the Refuge side.

We are currently considering 4 alternatives for the construction of fuel breaks (maps 1-4). Two of the alternatives (alternatives 1 and 3) consider the use of an existing road on property owned by yourself and George Robertson to the north of the Refuge. The other alternatives being considered (2 and 4) require varying levels of cooperation between the Refuge and DHHL for fuel break construction and maintenance.

The Refuge has selected Alternative 4 as the "preferred alternative". It is not anticipated that your lands will be used for the fuelbreak but we wanted to inform you that such an option was considered. This evaluation process is required under the National Environmental Policy Act (NEPA) of 1973, which also requires that an Environmental Assessment be prepared to address potential environmental impacts. A Draft Environmental Assessment and a Cultural Impact Assessment (required by the State of Hawaii) are nearing completion, and will be available for public review and comments shortly.

We are inviting interested parties to the Refuge on December 11, 2002 for a site visit. If you would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C. Wass

Richard C. Wass

Attachments: Four maps depicting alternatives

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 25, 2002

George Robertson
P.O. Box 44490
Kawaihae, HI 96743

Dear Robbie:

I write this letter to further inform you of a proposal being developed by the U.S. Fish and Wildlife Service and the State Department of Hawaiian Home Lands (DHHL) to create fuel breaks along the uppermost, fire prone areas of Hakalau Forest NWR. Funding for fuel breaks comes from the Wildland Urban Interface Fire Program.

If you recall, we discussed the project in July of this year. Originally we requested permission to construct a portion of fuel break on the Nobriga/Robertson side of the Upper Maulua boundary. On July 5, 2002, we sent a letter thanking you for granting us preliminary permission to construct the break, but after consultation with our bulldozer contractor, we decided it was more feasible to construct the fuel break on the Refuge side.

We are currently considering 4 alternatives for the construction of fuel breaks (maps 1-4). Two of the alternatives (alternatives 1 and 3) consider the use of an existing road on property owned by yourself and Freddy Nobriga to the north of the Refuge. The other alternatives being considered (2 and 4) require varying levels of cooperation between the Refuge and DHHL for fuel break construction and maintenance.

The Refuge has selected Alternative 4 as the "preferred alternative". It is not anticipated that your lands will be used for the fuelbreak but we wanted to inform you that such an option was considered. This evaluation process is required under the National Environmental Policy Act (NEPA) of 1973, which also requires that an Environmental Assessment be prepared to address potential environmental impacts. A Draft Environmental Assessment and a Cultural Impact Assessment (required by the State of Hawaii) are nearing completion, and will be available for public review and comments shortly.

We are inviting interested parties to the Refuge on December 11, 2002 for a site visit. If you would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C. Wass

Attachments: Four maps depicting alternatives

Appendix E

DEA Preliminary Consultation Letters

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

January 22, 2003

Mr. Rob Shallenberger
The Nature Conservancy
68-1796 Puu Nui St.
Waikoloa, Hawaii 96738

Dear Rob,

The staff at Hakalau Forest National Wildlife Refuge is currently working on a Draft Environmental Assessment for Fuel Break Construction on the Refuge and on adjacent lands owned and managed by the Department of Hawaiian Home Lands. We are considering four alternatives for fuel break construction. The purpose of the action is to protect the resources of neighboring land owners from fire that may ignite on the Refuge. The fuel breaks will also protect Refuge resources, including threatened and endangered species, in the event a neighboring fire threatens Refuge property. The project is funded by the Service's Wildland Urban Interface (WUI) Fire Program.

Currently, there is an increased risk of fire in the area immediately surrounding and within the Refuge due to a heavy infestation of gorse along much of the Refuge's western boundary. The risk of fire is further exacerbated by the heavy growth of exotic pasture grasses in the uppermost elevations of the Refuge, following its establishment in 1985.

I write this letter to request early consultation and review by your office of the enclosed Draft EA. We would appreciate your response at your earliest convenience. You are welcome to telephone or email comments to Donna Ball (808-933-6915, Donna_L_Ball@fws.gov) who is preparing the EA.

Sincerely,

Richard C. Wass, Refuge Manager

Enclosure: preliminary Draft EA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

January 22, 2003

Mr. Chris Yuen
Hawaii County Planning Dept.
101 Aupuni St., Rm. 3
Hilo, Hawaii 96720

Dear Mr. Yuen,

The staff at Hakalau Forest National Wildlife Refuge is currently working on a Draft Environmental Assessment for Fuel Break Construction on the Refuge and on adjacent lands owned and managed by the Department of Hawaiian Home Lands. We are considering four alternatives for fuel break construction. The purpose of the action is to protect the resources of neighboring land owners from fire that may ignite on the Refuge. The fuel breaks will also protect Refuge resources, including threatened and endangered species, in the event a neighboring fire threatens Refuge property. The project is funded by the Service's Wildland Urban Interface (WUI) Fire Program.

Currently, there is an increased risk of fire in the area immediately surrounding and within the Refuge due to a heavy infestation of gorse along much of the Refuge's western boundary. The risk of fire is further exacerbated by the heavy growth of exotic pasture grasses in the uppermost elevations of the Refuge, following its establishment in 1985.

I write this letter to request early consultation and review by your office of the enclosed Draft EA. We would appreciate your response at your earliest convenience. You are welcome to telephone or email comments to Donna Ball (808-933-6915, Donna_L_Ball@fws.gov) who is preparing the EA.

Sincerely,

Richard C Wass

Richard C. Wass, Refuge Manager

Enclosure: preliminary Draft EA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 26, 2002

Jon Giffin
State Division of
Forestry and Wildlife
P.O. Box 4849
Hilo, Hawaii 96720

Dear Jon:

Thank you for agreeing to review the Preliminary Draft EA we sent a few weeks ago. We are writing this letter to further inform you of the status of our project to construct fuel breaks on DHHL and Refuge lands bounding Hakalau Forest National Wildlife Refuge. Funding for fuel break construction comes from the Wildland Urban Interface Fire Program.

We are considering 4 alternatives for the construction of fuel breaks along the uppermost, fire prone areas of the Refuge. The location and width of fuel breaks were determined by the level of hazardous fuels in the area, particularly in relation to an infestation of gorse and to open grassland on the Refuge. These areas pose the greatest fire risk to the Refuge and adjacent landowners and it is hoped that the construction of a long-lasting, regularly maintained fuel break will mitigate that risk. Areas proposed for fuel break construction have been previously modified during the development of fence lines, road beds, and by many years of ranching activity. A Cultural Resource Survey of the proposed fuel break line has been completed through the required Federal Section 106 process. It is the determination of the archaeologist who conducted these surveys that no cultural resources will be impacted as a result of this action.

During the past 15 years the Refuge and volunteer groups have planted over 250,000 native tree seedlings (primarily koa), in former pasture lands. The risk of fire to this recovering ecosystem threatens not only common and endangered Hawaiian species, but also neighboring lands which may become the focus of reforestation efforts aimed at reducing the gorse infestation on Mauna Kea. The Pua Akala Cabin located on the Refuge, has recently been nominated to the National Historic Register and may also be impacted in the event of fire. The proposal to create fuel breaks also calls for reducing fuels around the Pua Akala, Nauhi, and Maulua cabins.

At this time, the Refuge has selected Alternative 4 as the "preferred alternative". The Draft Environmental Assessment and Cultural Impact Assessment (CIA) are nearing completion, and will be available for public review and comments shortly.

We are inviting cooperators, neighboring landowners, Hawaiian groups, and other interested parties, for a site visit to the Refuge on December 11, 2002. This will be an opportunity to see the area being considered for the fuel break, and to discuss questions and concerns. If you or a member of your staff would like to attend or discuss the project in further detail, please contact me at 933-6915 by December 9. I look forward to speaking with you soon.

Sincerely,

Richard C. Wass

Richard C. Wass

Enclosure: Map showing location of "preferred" alternative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

November 25, 2002

Linda Chin
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Linda:

I write this letter to further inform you of the status of our project to construct fuel breaks on DHHL and Refuge lands bounding Hakalau Forest National Wildlife Refuge. Funding for fuel break construction comes from the Federal Wildland Urban Interface Fire Program.

As you recall, we are currently considering four alternatives for the construction of fuel break. Maps depicting break locations under each alternative are attached. All four alternatives call for construction of some of the fuel breaks on DHHL land. Our contractor and the refuge staff will, therefore, need initial and long term access to your property for construction and semiannual maintenance of the breaks. The Refuge has selected Alternative 4 as the "preferred alternative". The Draft Environmental Assessment and Cultural Impact Assessment (CIA) are nearing completion and will soon be sent to you and others for review and comments.

We are inviting cooperators, interested parties, and Hawaiian groups to the Refuge on December 11, 2002 for a site visit. If you or a member of your staff would like to visit the site on December 11, please contact me at 933-6915 by December 9. Contact me any time if you would like further discussion on the project.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manager

Attachments: Four maps depicting alternatives

FILE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
HAKALAU FOREST NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

September 19, 2002

Mr. Paul Henson
U.S. Fish and Wildlife Service
Ecological Services
P.O. Box 50088
Honolulu, Hawaii 96850

Dear Paul,

The staff at Hakalau Forest NWR is currently working on a Draft Environmental Assessment for Fuel Break Construction on the Refuge and on adjacent lands owned and managed by the Department of Hawaiian Home Lands. The purpose in undertaking this action is to protect the resources of neighboring land owners from fire that may ignite on the Refuge through the Service's Wildland Urban Interface (WUI) Program. The Refuge will also benefit from this action, as fuel breaks will protect Refuge resources, including threatened and endangered species, in the event a neighboring fire threatens the Refuge.

Currently, there is an increased risk of fire in the area immediately surrounding and within the Refuge due to a heavy infestation of gorse along much of the Refuge's western boundary. The risk of fire is further exacerbated by the heavy growth of exotic pasture grasses in the uppermost elevations of the Refuge, following it's establishment in 1985.

I write this letter to request an Internal Review of the enclosed preliminary DEA and the initiation of an intra-Service Section 7 Consultation on the proposed action. Donna Ball, of my staff, has already had some contact with Michael Molina regarding this DEA. We would appreciate your response by October 9, or at your earliest convenience.

Sincerely,

Dick

Richard C. Wass, Refuge Manager

Enclosure: preliminary Draft EA
cc: Bruce Babb, Fire Management

In Reply Refer to:
PI-02-191 (JTN)

Memorandum

To: Refuge Manager, Hakalau Forest National Wildlife Refuge, U.S. Fish and Wildlife Service, Hilo, Hawai`i

From: Field Supervisor, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service, Honolulu, Hawai`i

Subject: Review of preliminary draft of envrironmental assessment for fuel break construction at Hakalau Forest National Wildlife Refuge

We received your September 19, 2002, request for an internal review of the Draft Environmental Assessment (DEA) for Fuel Break Construction at the Hakalau Forest National Wildlife Refuge (NWR) within the Big Island NWR Complex. The following comments are provided for your consideration.

GENERAL COMMENTS

We find that the DEA adequately describes the overall intent and goal of the project, the existing resources in the affected environment, potential project alternatives, and measures to mitigate environmental effects of those alternatives. We agree with the selection of Alternative 4 as the proposed action. Based on your analysis, we agree that no significant impacts to biological resources are anticipated. Although the building of some firebreaks may increase public access to some areas, impacts from potential increased public use in these areas are anticipated to be minimal.

The criteria for evaluating the Alternatives are presented in a decision matrix table (Table 3). Use of the decision matrix is described in Section 4.6, Summary of Consequences of the Alternatives. The written description of the process for weighing between the different alternatives and for assigning weighting values to criteria should be more fully developed.

Alternative 2 provides slightly less fire protection to Refuge resources and slightly less protection to adjacent land owners than Alternatives 1 and 4. Alternative 3 provides less fire protection to Refuge acreage but substantial protection to neighboring landowners, although less than Alternatives 1 and 4. Alternative 3 has greater risk of soil erosion than Alternatives 1, 2, and 4. Alternative 4, the proposed action, has several advantages in that it eliminates the need for numerous gates to traverse gulch crossings, the need to grade and fill existing

gulch beds on Refuge property, and (unlike Alternative 1) has firebreaks that flank upper sections of the Piha State Forest Reserve. Alternative 5 (the no action alternative) has the substantial disadvantage that by not constructing firebreaks, considerable damage to refuge resources and adjacent ranch land could occur as a result of fire.

The rationale for selecting Alternative 4 over the other alternatives could be clarified by emphasizing how the construction of fire breaks along shared boundaries between the Refuge and neighboring landowners maximizes fire protection for all parties. Mention is made that all alternatives require cooperation with neighboring landowners and some alternatives require cooperation with fewer neighboring landowners. However, it is not clear how much weight is given to minimizing the number of landowners whose cooperation is required for building the firebreak. It might be good to expand on this criteria. For example, if it is true that delays in the implementation of the proposed action could result as the number of landowners involved increases, then this would also increase the chance of fire damaging Refuge and adjacent lands. We believe information such as this would be useful in helping to explain why Alternative 4 was selected as the proposed action.

SPECIFIC COMMENTS

Section 1.4.7, Refuge Wildland Fire Management Plan, page 7. The last paragraph in this section appears to imply that it is a summary of the management actions of the entire Refuge Wildland Fire Management Plan. The Management Plan, however, has components other than removing grasses around Refuge structures.

Section 2.2, Features common to all Alternatives, page 8. We recommend adding a brief introduction stating that measures to mitigate anticipated adverse effects are described in detail in section 2.2.6 and Section 4, Environmental Consequences.

Section 2.2.3, Effects on the Physical Environment, pages 8-9. Measures are not described to mitigate potential increased erosion by removing vegetation in fuel breaks. We recommend describing measures to mitigate erosion anticipated to result from vegetation removal in fuel break/construction areas.

Section 2.2.3, Public Use, page 10. There are concerns that possible increased public use will have negative impacts in areas for which roads are improved and firebreaks constructed. Increased risk of fire ignition is an example. We recommend describing how these potential impacts might be minimized through education or other means.

Section 2.2.6, Mitigation Measures, second paragraph, page 13. We suggest clarifying the intent of, and methods for, careful removal of grass around buildings. It appears this measure is recommended because archeologists were unable to evaluate these areas adequately.

We appreciate the opportunity to comment on the DEA. If you have any questions or comments, please contact Fish and Wildlife Biologist Jay Nelson by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BIG ISLAND NATIONAL WILDLIFE REFUGE COMPLEX
32 KINOOLE STREET, SUITE 101
HILO, HI 96720

IN REPLY REFER TO:

FILE

July 5, 2002

George Robertson
P.O.Box 44490
Kawaihae, HI 96743

Dear Robbie:

I write this letter as a followup to the telephone conversation we had on July 3, 2002 during which I described a plan to construct firebreaks along portions of the upper (western) boundary of Hakalau Forest National Wildlife Refuge. Funding for these firebreaks comes from the Wildland Urban Interface Fire Program. As part of this effort, we plan to construct a continuous firebreak approximately 25 feet wide along the boundary between the Upper Maulua Unit of the Refuge and the 120 acres of property owned by yourself, your family and Alfred Nobriga as shown on the attached map. The firebreak will be cleared, cut, graded and smoothed by a bulldozer, hopefully to the point where it can be driven by a four-wheel-drive ATV. The break will be mowed periodically to minimize the fuel load so fire will not carry across it. The break will be routed so as to minimize the amount of grading and cutting of substrate as well as damage to native vegetation, especially trees larger than 4" diameter.

Most of the firebreak will be located on refuge property on the south side of the existing boundary fence. However, due to an area of extremely steep and rugged terrain on the refuge side of the fence, we propose to locate approximately 1,000 feet of the firebreak on the Robertson/Nobriga side of the fence where the terrain would require much less bulldozing and no tree removal. Gates would be placed in the fence so that a dozer/tractor/ATV could drive down the break on the refuge side, cross over to the north side for about 1,000 feet, then cross back into the refuge and continue on down to the bottom of your 120 acre parcel. I have drawn the proposed firebreak on the attached map which shows the locations for the proposed gates and the section where the firebreak would be on the north side of the fence. The map indicates that part of the break will be on the 40 acre parcel owned by Mr. Nobriga and a portion will be on the 40 acre parcel owned by you and your family.

Thank you for the preliminary permission you gave during our telephone conversation to allow the Refuge to construct a portion of the firebreak on your property, to periodically access that area for maintenance of the firebreak and the refuge fence, and to access the break in the event of a wildfire. Please study the enclosed map and discuss the firebreak with your co-owners and Mr. Nobriga who has also given preliminary permission for the break. Let me know if you have second thoughts about the location of the break or questions regarding the construction process.

Within the next month or two, I will send you a copy of the Draft Environmental Assessment which will describe the project in detail. At that time, you will have another opportunity for comment.

Sincerely,

Richard C. Wass, Refuge Manager

Enclosure: Map showing location of proposed firebreak

FILE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BIG ISLAND NATIONAL WILDLIFE REFUGE COMPLEX
32 KINOOLE STREET, SUITE 101
HILO, HI 96720

IN REPLY REFER TO:

July 5, 2002

Alfred Nobriga
P.O. Box 401
Kamuela, HI 96743

Dear Freddy:

I write this letter as a followup to the conversation we had on July 2, 2002 during which Donna Ball and I described a plan to construct firebreaks along portions of the upper (western) boundary of Hakalau Forest National Wildlife Refuge. Funding for these firebreaks comes from the Wildland Urban Interface Fire Program. As part of this effort, we plan to construct a continuous firebreak approximately 25 feet wide along the boundary between the Upper Maulua Unit of the Refuge and the 120 acres of property owned by yourself, George Robertson and the Robertson family as shown on the attached map. The firebreak will be cleared, cut, graded and smoothed by a bulldozer, hopefully to the point where it can be driven by a four-wheel-drive ATV. The break will be mowed periodically to minimize the fuel load so fire will not carry across it. The break will be routed so as to minimize the amount of grading and cutting of substrate as well as damage to native vegetation, especially trees larger than 4" diameter.

Most of the firebreak will be located on refuge property on the south side of the existing boundary fence. However, due to an area of extremely steep and rugged terrain on the refuge side of the fence, we propose to locate approximately 1,000 feet of the firebreak on the Nobriga/Robertson side of the fence where the terrain would require much less bulldozing and no tree removal. Gates would be placed in the fence so that a dozer/tractor/ATV could drive down the break on the refuge side, cross over to the north side for about 1,000 feet, then cross back into the refuge and continue on down to the bottom of the 120 acre parcel. I have drawn the proposed firebreak on the attached map which shows the locations for the proposed gates and the section where the firebreak would be on the north side of the fence. The map indicates that part of the break will be on the 40 acre parcel owned by you and a portion will be on the 40 acre parcel owned by George Robertson and his family.

Thank you for the preliminary permission you gave during our recent conversation to allow the Refuge to construct a portion of the firebreak on your property, to periodically access that area for maintenance of the firebreak and the refuge fence, and to access the break in the event of a wildfire. Please study the enclosed map and discuss the firebreak with Mr. Robertson who has also given preliminary permission for the break. Let me know if you have second thoughts about the location of the break or questions regarding the construction process.

Within the next month or two, I will send you a copy of the Draft Environmental Assessment which will describe the project in detail. At that time, you will have another opportunity for comment.

Sincerely,

Dick

Richard C. Wass, Refuge Manager

Enclosure: Map showing location of proposed firebreak

Appendix F

DEA Public Comments and Agency Response Letters

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard
Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer to:
PI-02-191 (ITN)

MAR 18 2003

Memorandum

To: Refuge Manager, Hakalau Forest National Wildlife Refuge, U.S. Fish and Wildlife Service, Hilo, Hawai`i

From: Field Supervisor, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service, Honolulu, Hawai`i

Subject: Forwarded review of preliminary draft of envrironmental assessment for fuel break construction at Hakalau Forest National Wildlife Refuge

Per a March 12, 2003 request from Donna Ball of your staff, I am attaching a hard copy of our earlier comments submitted to your office on October 24, 2003 *via* e-mail.

We appreciated the opportunity to comment on the preliminary draft environmental assessment (EA), and apologize that we are unable to provide review or comment on the draft EA, due to other workoad priorities. We hope that our earlier comments were useful. If you have any questions or comments, please contact Fish and Wildlife Biologist Jay Nelson by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Attachment

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 21, 2003

To: Paul Henson, Field Supervisor, Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Henson:

Thank you for your letter, dated March 18, 2003, following the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at 933-6915.

Sincerely,

James Patrick Gilgan

Richard C. Wass
for Refuge Manger

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

March 13, 2003

Mr. Richard C. Wass
Refuge Manager
Hakalau Forest NWR
U.S. Fish and Wildlife Service
32 Kinoole Street, Suite 101
Hilo, HI 96720

Dear Mr. Wass:

RE: DRAFT ENVIRONMENTAL ASSESSMENT
DHHL/HAKALAU FOREST NWR FUEL BREAK CONSTRUCTION PROJECT

This responds to your request for comments on the above-referenced Draft Environmental Assessment.

We have no comments to offer at this time regarding the Draft EA.

Thank you for the opportunity to comment.

Sincerely,

DARRYL OLIVEIRA
Fire Chief

LN:lk

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 19, 2003

To: Darryl Olivera, Fire Chief, County of Hawaii

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Olivera:

Thank you for your letter, dated March 13, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at (808) 933-6915.

Sincerely,

James Patrick Glynn

Richard C. Wass
for Refuge Manger

PHONE (808) 594-1888

FAX (808) 594-1865

Dick — Jim — Kyle — Donna

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

March 11, 2003

HRD 03/903

Refuge Manager
Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

Subject: Draft Environmental Assessment
DHHL / Hakalau Forest NWR Fuel Break Construction Project
Island of Hawaii

Dear Mr. Wass:

This is in response to your letter of February, 2003, within which you had requested the Office of Hawaiian Affairs to review and comment on the Draft Environmental Assessment (DEA) for the proposed Dept. of Hawaiian Home Lands/Hakalau Forest National Wildlife Refuge Fuel Break Construction Project on the Island of Hawaii

Thank you for forwarding the Cultural Resource Report for the Hakalau Forest National Wildlife Refuge Wildland Urban Interface Firebreak Project. Upon review of your documents, OHA concurs with your "no adverse" effect on historic properties within the project area.

Thank you for the opportunity to review and comment on the proposed project. Please feel free to contact me at 594-1831 should you have any questions.

Sincerely,

Peter L. Yee
Director, Nationhood and Native Rights Division
Office of Hawaiian Affairs

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 21, 2003

To: Peter L. Yee, Director, Nationhood and Native Rights Division, Office of Hawaiian Affairs

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Yee:

Thank you for your letter, dated March 11, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at 933-6915.

Sincerely,

James Patrick Glynn

Richard C. Wass
for Refuge Manger

THE NATURE CONSERVANCY OF HAWAI'I

68-1796 Pu'u Nui Street
Waikoloa, HI 96738

March 11, 2003

Mr. Richard C. Wass
Refuge Manager
Hakalau Forest NWR
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

Dear Dick:

Thank you for the opportunity to comment on the Draft Environmental Assessment (DEA) for Fuel Break Construction on Hawaiian Home Lands adjacent to Hakalau Forest NWR. You have prepared a convincing assessment of proposed alternatives, all of which will provide protection to the Refuge and adjacent lands in the event of wildfire. The discussion of alternatives is well researched and documented. We concur with your designation of Alternative 4 (Construction of Fuel breaks on Refuge and DHHL lands) as the Preferred Alternative.

We offer one specific comment. The DEA states that in order to maintain the fuel breaks, herbicide spraying will be required in areas adjacent to the gorse infestation, while cattle will help to maintain low fuel loads where fuel breaks pass through grazing land. However, the need to monitor the fuel breaks for invasive plants besides gorse and pasture grasses is not mentioned. We believe that monitoring should be implemented in case the cleaning and inspection of all vehicles and heavy equipment prior to fuel break construction fails to avoid the introduction of alien wees.

Thanks again for the opportunity to comment.

Aloha,

Robert Shallenberger
Big Island Conservation Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Robert Shallenberger, Big Island Conservation Director, The Nature Conservancy of Hawaii

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Rob:

Thank you for your letter, dated March 11, 2003, during the public comment phase of the subject project. We offer the following responses in the respective order of your comments:

Monitoring alien weeds. The Refuge intends to monitor fuel breaks for gorse reinvasion and for new alien weeds on a monthly basis during regularly scheduled fence line inspections.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at (808) 933-6915.

Sincerely,

Richard C. Wass
Refuge Manger

Harry Kim
Mayor

Bruce C. McClure
Director

Ronald K. Takahashi
Deputy Director

County of Hawaii
DEPARTMENT OF PUBLIC WORKS
Aupuni Center
101 Pauahi Street, Suite 7 · Hilo, Hawaii 96720-4224
(808) 961-8321 · Fax (808) 961-8630

March 10, 2003

Ms. Donna Ball
Hakalau Forest National Wildlife Refuse
U. S. Department of the Interior
Fish and Wildlife Service
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
FUEL BREAK CONSTRUCTION PROJECT
DHHL / Hakalau Forest National Wildlife Refuse
TMKs: 2-9-05:05, 3-7-01:10, 3-8-01:02 & 09, 2-6-18:02

We have reviewed the subject DEA forwarded by your letter received February 5, 2003 and have the following comments.

All earthwork activity, including grading and grubbing, shall conform to Chapter 10, Erosion and Sedimentation Control, of the Hawaii County Code. The proposed fuel break construction may require a grading permit from the Department of Public Works.

Questions may be referred to Mr. Kelly Gomes of our Engineering Division at 961-8327.

for GALEN M. KUBA, Division Chief
Engineering Division

KG

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Galen M. Kuba, Division Chief, Engineering Division, Dept. of Public Works

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Kuba:

Thank you for your letter, dated March 10, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at (808) 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger

DANIEL K. INOUYE
HAWAII

APPROPRIATIONS
Subcommittee on Defense

COMMERCE, SCIENCE, AND TRANSPORTATION
Subcommittee on Surface Transportation
and Merchant Marine

COMMITTEE ON INDIAN AFFAIRS

DEMOCRATIC STEERING COMMITTEE

COMMITTEE ON RULES AND ADMINISTRATION

D Donna

United States Senate
SUITE 722, HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510-1102
(202) 224-3934
FAX (202) 224-6747

PRINCE KUHIO FEDERAL BUILDING
ROOM 7-212, 300 ALA MOANA BOULEVARD
HONOLULU, HI 96850-4975
(808) 541-2542
FAX (808) 541-2549

101 AUPUNI STREET, NO. 205
HILO, HI 96720
(808) 935-0844
FAX (808) 961-5163

February 28, 2003

Mr. Richard C. Wass
Refuge Manager
Hakalau Forest NWR
U.S. Fish and Wildlife Service
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

Dear Mr. Wass:

This is to acknowledge receipt of your letter concerning the Department of Hawaiian Home Lands/Hakalau Forest NWR Fuel break Construction Project and a copy of the Draft Environmental Assessment. Your materials have been forwarded to our Honolulu Office.

If I can be of future assistance to you, please do not hesitate to contact me.

Aloha,

William Kikuchi aem

WILLIAM KIKUCHI
Field Representative

WK:aem

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: William Kikuchi, Field Representative for Senator Daniel K. Inouye

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Kikuchi:

Thank you for your letter, dated February 28, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at (808) 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger

LINDA LINGLE
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENT QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

February 10, 2003

Micah Kane
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, Hawaii 96805

Attn: Linda Chinn

Dear Mr. Kane:

Subject: Environmental assessment (EA), Hakalau Forest NWR Fuel Break Construction Project

In order to reduce bulk and save on paper, please consider printing on both sides of the pages in the final document. In addition, we have the following comments to offer:

Correspondence: In the final EA be sure to enclose copies of all responses to your correspondence made during the pre-consultation phase as well as the draft EA comment period.

Contacts:

Will hunters be affected by this project? If so, consult with the local hunting organization, allowing them sufficient time to review the draft EA and submit comments.

If you have not done so already, send a copy of the EA to the Land Division of the Department of Land & Natural Resources, which has jurisdiction over all conservation lands.

Terminology: Section 1.4.7 uses the term *slip-on unit* and sections 2.2.2, 4.4.1 and 4.6.3 use a shorthand notation similar to *>4" dbh*. In the final EA please restate these terms in lay language.

Agroforestry: The EA mentions the possibility of a future forestry operation for DHHL profit, planting koa and non-native conifers. This kind of venture can have serious environmental effects to large acreages of land. In the final EA disclose details of this operation along with impacts and proposed mitigation measures.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Donna Ball

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Genevieve Salmonson, Director, Office of Environmental Quality Control

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Ms. Salmonson:

Thank you for your letter dated February 10, 2003, during the public comment phase of the subject project. We offer the following responses in the respective order of your comments:

1. Contacts. Will hunters be affected by this project?

Hunters will not be affected by this project. DHHL and Hakalau Forest NWR do not currently allow public hunting on the lands in question. Access to the Piha and Laupahoehoe State Game Management areas for public hunting will be unaffected by the fuel break project.

2. Terminology.

A ***slip-on unit*** consists of a portable water tank, pump, and hose, and can be carried in the bed of a pick-up truck when responding to wildfire. ***Dbh*** is shorthand for diameter at breast height, used to determine the trunk size of trees.

4. Agroforestry.

The U.S. Fish & Wildlife Service and DHHL are partnering in a 195 acre koa reforestation project on DHHL lands immediately adjacent to the Refuge's western boundary (Figure 8 of DEA). A separate undertaking by DHHL is outlined in the **Final Environmental Assessment** for the ***Koa Salvage-Reforestation and Gorse Containment Project, Humuula, Island of Hawaii*** submitted to OEQC in August 2001. Please refer to this document for further details about the proposed operation, a discussion of impacts, and mitigation measures to be employed. If you require a copy we will be happy to provide you with one.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions please call me at 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger

NRCS
Natural Resources Conservation Service
P.O. Box 1089
Kamuela, HI 96743

United States Department of Agriculture

Our People...Our Islands...In Harmony

To: Donna Ball, USFSWS. Subject Code: 190- 15-13 EA/EIS reviews.

From: Steve Skipper, DC SS Date: 02/21/2003

I would like to thank you for the opportunity to review the DHHL/HFNWR Fuel Break Construction Project EA. You folks have put a lot of work into the document and it seems to cover "all bases". I did not "detail read" page by page but concentrated on the alternatives and your discussion of impacts. In the review I was leaning toward Alternative 3 until I got to # 4 and felt like that was the most comprehensive approach. You mentioned use of water bars on the roads and that is something I was going to suggest if I hadn't seen it. There are guides for the spacing of those based on road slopes and we may have references in our Field Office Technical Guides (FOTG). The guides were recently revised so I'm not certain, but you can search them out electronically from the NRCS and NRCS Hawaii home pages on the world wide web. US Forest Service and the former Soil Conservation Service (NRCS) has a publication called, **Building Water Pollution Control into Small Private Forest and Ranchland Roads** - 9/1991 that has a lot of great practical and simple erosion and sediment control practices that could possibly help you out as situations arise. We have a copy on hand at the Waimea office if you want to have a look at it in the future.

The only things I noted in the EA were the planting of coniferous trees (fire hazard?) and the lack of knowledge on my part about makai hazards and the need any for fuel breaks down hill. I'm sure it is wetter and less "prone" down hill but I haven't been in the area really, so I was curious.

Also I spoke to Harry Toki the Hilo District Conservationist recently. He said that their office had been contacted regarding the refuge and this project relating to a possible Conservation Plan and some of the things you and I had spoken about when you called. The refuge spans both of our districts and represents a major land use. I think we could look at the idea of a plan further and review what is needed and if there is "person power" available to accomplish the task. Perhaps we should all get together at some time in the future and discuss that issue in greater detail.

Cc: Larry Yamamoto, A StC., Harry Toki, Hilo DC.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Steve Skipper, District Conservationist, USDA, Natural Resources Conservation Service

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Skipper:

Thank you for your letter, dated February 21, 2003, during the public comment phase of the subject project. We offer the following responses in the respective order of your comments:

1. Erosion and Sediment Control. Thank you for providing information about the publication *Building Water Pollution Control into Small Private Forest and Ranchland Roads* produced by the U.S. Forest Service and NRCS. We plan to incorporate such controls into the fuel break project and look forward to working with your agency to develop a Conservation Plan.

2. Coniferous trees. The Department of Hawaiian Home Lands and the U.S. Fish & Wildlife Service, Hakalau Forest NWR are partnering in a 195 acre koa reforestation project along the southwest boundary , immediately adjacent to the Refuge (Figure 8 of DEA). DHHL has also proposed a separate venture in Humuula, the *Koa Salvage-Reforestation and Gorse Containment Project.* This project is described in detail in a Final Environmental Assessment drafted in August of 2001. We would be happy to request a copy if you require further information about this project.

3. Makai fire hazards. The Refuge has not considered construction of fuel breaks in intact rainforest areas that are makai of the heavily disturbed, dry, high elevation, more fire prone pasturelands. Makai forested areas tend to receive higher annual rainfall and are located further away from human use areas and potential ignition sources. The Refuge is also concerned that bulldozing fuel breaks in "intact" forest areas would create possible corridors for alien weeds to become established. This is not a concern in the high elevation pasturelands where alien grass and gorse already dominate the landscape.

4. Conservation Plan The Refuge is very interested in working with your office to develop a Conservation Plan. We would like to start on this soon so that implementation of this project may begin by June of this year. We appreciate any technical guidance your office can provide us with on matters of soil erosion, sediment control, and maintenance of a healthy watershed.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger

D Donna

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

February 6, 2003

Mr. Richard C. Wass
United States Department of the Interior
Fish and Wildlife Service
Hakalau Forest NWR
32 Kinoole Street, Suite 101
Hilo, HI 96720

Dear Mr. Wass:

Subject: Draft Environmental Assessment (DEA)
Request: Request for Comments for Fuel Break Project
TMK: 2-9-5: 5, 3-7-1: 10, 3-8-1: 9, 3-8-1: 2, 2-6-18: 2

This is to acknowledge receipt of your letter dated January 22, 2003 requesting comments on the Draft Environmental Impact Statement for the Fuel Break Construction Project on DHHL lands and the Hakalau Forest National Wildlife Refuge.

The properties are situated in the State Land Use Agricultural and Conservation districts and zoned Agricultural (A-40a) by the County. The parcels are owned by the Department of Hawaiian Home Lands and/or the U.S. Fish and Wildlife Service. The properties are not situated within the County's Special Management Area (SMA).

Thank you for the opportunity to provide comments. If you have any questions, please call our office at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

PF:pak
p:\wpwin60\Ch343\2003\DEADHHLFuelBreak.doc

cc: Long Range Planning

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Christopher J. Yuen, Director, Hawaii County Planning Department

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Yuen:

Thank you for your letter, dated February 6, 2003, during the scoping phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at 933-6915.

Sincerely,

Richard C. Wass
Refuge Manger

D To Donna

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809

March 3, 2003

DHHLHAKALAUFUEL.RCM
LD-NAV

L-999/573

Richard C. Wass, Refuge Manager
Hakalau Forest NWR
U.S. Fish and Wildlife Service
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

Dear Mr. Wass:

SUBJECT: Draft Environmental Assessment Department of Hawaiian Home Lands/Hakalau Forest National Wildlife Refuge - Fuel Break Construction Project, Island of Hawaii

Thank you for the opportunity to review and comment on the subject matter.

A copy of the Draft Environmental Assessment pertaining to the subject matter was made available to the following Department of Land and Natural Resources' Divisions for their review and comment:

Division of Aquatic Resources - Division of Forestry & Wildlife
Division of State Parks - Engineering Division - Commission on Water Resource Management - Land-Planning & Technical Services
Land-Hawaii District Land Office

Attached herewith is a copy of the Division of State Park's response.

The Department of Land and Natural Resources has no comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0384.

Very truly yours,

Charlene P. Unoki
for DIERDRE S. MAMIYA
Administrator

C: HDLO

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

___RES MGT BR*
___CLERICAL
___ADMIN ASST
___INTERP BR
___
FOR:
___CIRC/POST/STAFF RM
___COMMENTS & REC
___DRAFT REPLY
___FILE
✓ FOLLOW UP
___INFO
___RUN COPIES_____
___RUSH DUE_____
___SEE ME
___FAX/SEND COPY TO_____

February 13, 2003

L-573
Suspense Date: 2/28/03

LD/NAV
Ref.: DHHLHAKALAUFUEL.CMT

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
Na Ala Hele Trails
✓XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
XXX Land-Planning and Technical Services
XXX Land-Hawaii District Land Office

FROM: Charlene E. Unoki, Acting Assistant Administrator
Land Division

SUBJECT: Draft Environmental Assessment Department of Hawaiian Home Lands/Hakalau Forest National Wildlife Refuge - Fuel Break Construction, Island of Hawaii

Please review the document (January 2003) covering the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

Should you need more time to review the document, please contact Nicholas A. Vaccaro at ext.: 7-0384.

Note: One copy of the document is available for your review in the Land Division Office, Room 220.

If this office does not receive your comments on by the suspense date, we will assume there are no comments.

(✓) We have no comments. ( ) Comments attached.

Signed:

Date: FEB. 27 2003

Name: Daniel S. Quinn

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Charlene E. Unoki, Acting Assistant Administrator, Land Division Department

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Ms. Unoki:

Thank you for your letter, dated February 13, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger

DANIEL K. AKAKA
HAWAII

WASHINGTON OFFICE:
141 HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510
TELEPHONE: (202) 224-6361

HONOLULU OFFICE:
3106 PRINCE JONAH KUHIO
KALANIANAOLE FEDERAL BUILDING
P.O. BOX 50144
HONOLULU, HI 96850
TELEPHONE: (808) 522-8970

United States Senate

WASHINGTON, DC 20510-1103

COMMITTEES
ARMED SERVICES
ENERGY AND NATURAL RESOURCES
GOVERNMENTAL AFFAIRS
INDIAN AFFAIRS
VETERANS' AFFAIRS
SELECT COMMITTEE ON ETHICS

February 28, 2003

Mr. Richard Wass
Refuge Manager
U.S. Fish and Wildlife Service
Hakalau Forest National Wildlife Refuge
U.S. Department of the Interior
32 Kinoole Street, Suite 101
Hilo, HI 96720

Dear Mr. Wass:

Thank you for providing me a copy of the Draft Environmental Assessment (DEA) for the Department of Hawaiian Home Lands (DHHL)/Hakalau Forest National Wildlife Refuge fuel break construction project on the island of Hawaii.

I appreciate the need to protect forested areas against wildfires by constructing fuel breaks in the makai areas of the refuge, and welcome the cooperation between the DHHL, the U.S. Fish and Wildlife Service (FWS), and other partners in producing the joint DEA. I was pleased to see the thorough assessment of the cultural environment where the construction would take place, and the identification of the variety of cultural resources that might be affected. I noted the archaeologist's recommendations to mitigate the impacts. The careful protection of such valued sites and objects is very important to me.

Again, mahalo for sending me a copy of the DEA, and I look forward to seeing the final assessment.

Aloha pumehana,

Daniel K. Akaka

DANIEL K. AKAKA
U.S. Senator

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Hakalau Forest National Wildlife Refuge
32 Kinoole Street, Suite 101
Hilo, Hawaii 96720

March 14, 2003

To: Daniel K. Akaka, U.S. Senator

From: Richard C. Wass, Refuge Manager, Hakalau Forest NWR

Subject: Draft Environmental Assessment for the DHHL / Hakalau Forest NWR Fuel break Construction Project on the Island of Hawai'i

Dear Mr. Akaka:

Thank you for your letter, dated February 28, 2003, during the public comment phase of the subject project.

Your letter, along with this response, will be incorporated into the forthcoming Final Environmental Assessment. If needed, corrections or clarifications will be made in the document. We will provide you with a copy of the Final EA upon it's completion. We appreciate your interest and participation in this phase of the project. If you have any questions, please call me at (808) 933-6915.

Sincerely,

Richard C Wass

Richard C. Wass
Refuge Manger