



EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

February 26, 1982

Mr. Roy R. Takemoto, Chairman
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Takemoto:

Subject: Environmental Impact Statement for Na Pali Coast
Management Plan

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the proposing agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis of alternatives to the proposed action.

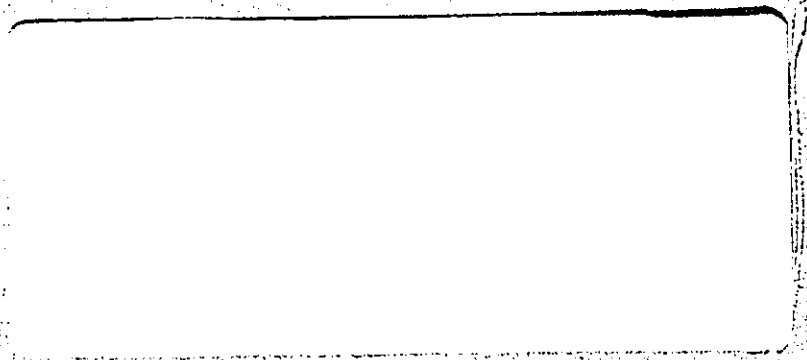
With warm personal regards, I remain,

Yours very truly,


George R. Ariyoshi

cc: Honorable Susumu Ono

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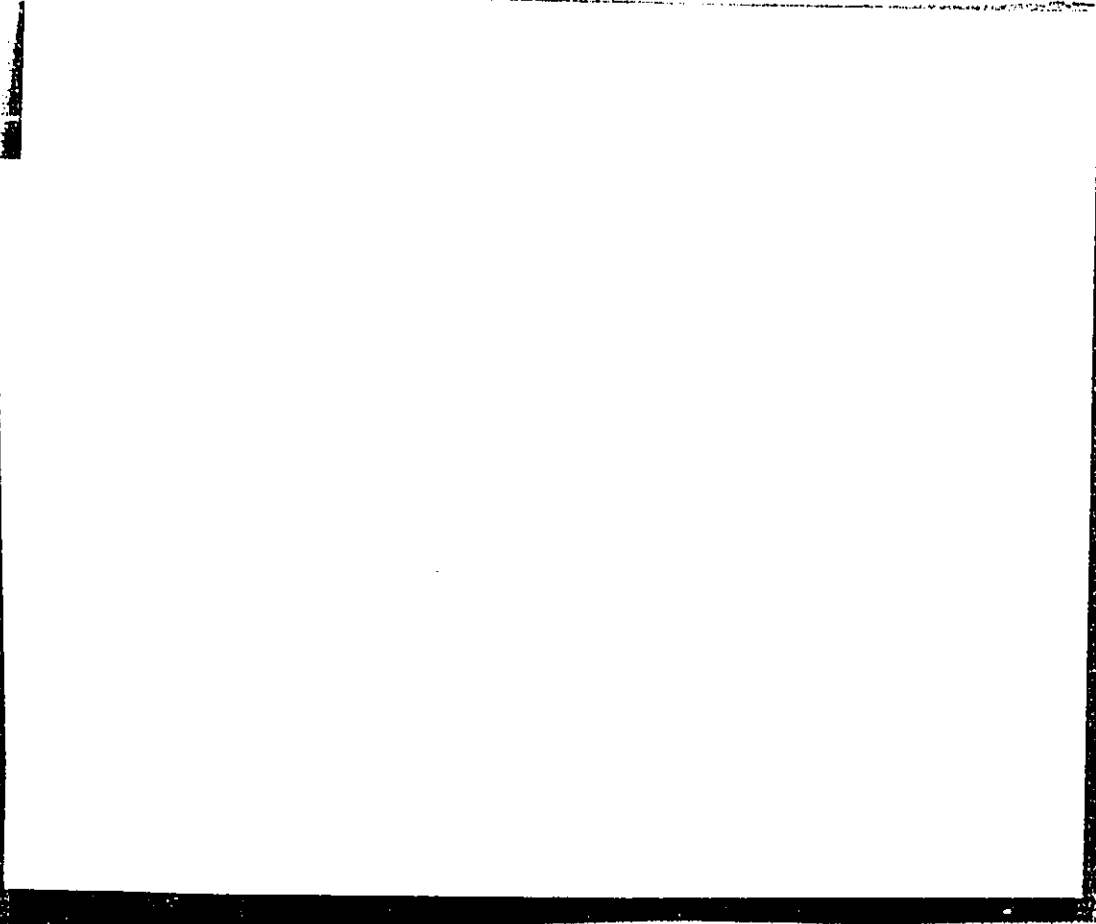


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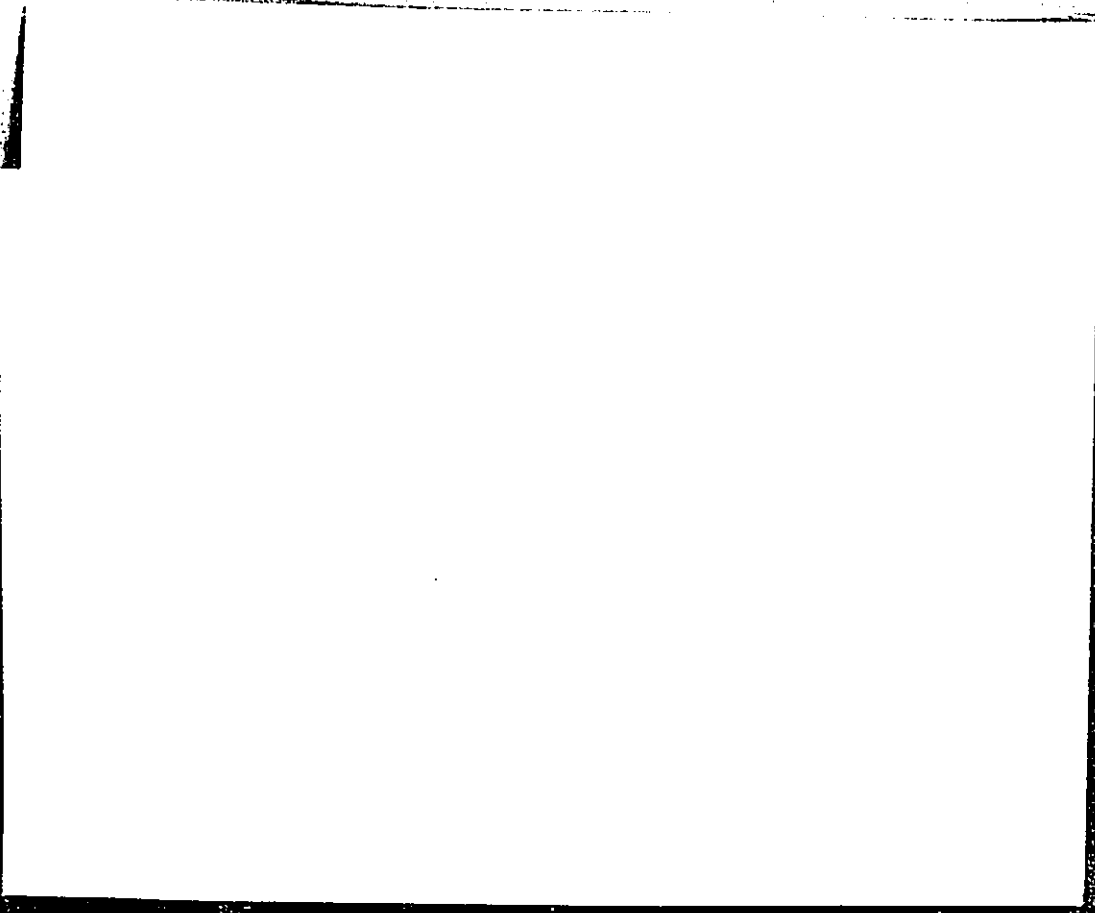
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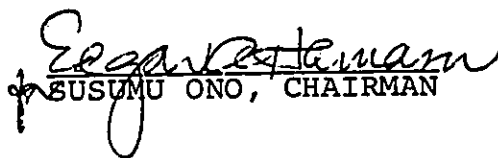
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Na Pali Coast Management Plan
Revised Environmental Impact Statement

Prepared by

Division of State Parks
Outdoor Recreation and Historic Sites
Department of Land & Natural Resources


SUSUMU ONO, CHAIRMAN

9/29/81
DATE

Revised

Environmental Impact Statement

September 1981

Project: Na Pali Coast Management Plan

Location: Na Pali Coast
Island of Kauai

Proposing Agency: State Parks Division
Department of Land and Natural Resources
State of Hawaii

Accepting Authority: Governor
State of Hawaii

Contact: State Parks Division
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Telephone No.: 548-7455

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SECTION 1

PROJECT DESCRIPTION

I. Introduction

In the past state parks have provided for unrestricted numbers of users and developed more facilities to accommodate more use. Today, in many parks, this approach is no longer accepted. There is a growing need to account for the style of visitor use of a particular area and the visitors' perception of the quality of the recreation experience. As use has increased there has also been a greater need to protect many of the historic and natural resource attractions themselves. Thus there is a need to combine the management of visitor use with the more traditional resource management and services management activities in order to provide a total management system. There are few guidelines to follow in this pioneering approach so innovation is necessary.

On the Na Pali Coast increased recreation use over the past few years including long term "camping" and unrestricted public access by commercial tour boat and helicopter operations has generated intense public concern. Conflicts among the lifestyles of visitors and potential visitors have been cited and the previous "wilderness" type of experience has been seriously reduced for many visitors. In response to these immediate concerns, the Board of Land and Natural Resources accepted the Na Pali Coast Interim Management Plan on February 23, 1979. A user permit system was established and the use of commercial helicopters and boats was restricted. In accepting the interim plan it was understood that a permanent plan would be developed within 12 to 18 months after additional resource information and user data could be gathered.

Because of the need to resolve existing problems and meet the requested timetable, the main purpose of the Na Pali Coast Management Plan is limited to developing an adequate system for managing the traditional types of use and the trails and other intensively used areas where this traditional use has been focused. However, the identification of natural and cultural resource management needs in these intensively used areas and the user data and visitor satisfaction response have allowed us to adjust the amount of use from that given in the interim management plan. These adjustments in the amount of visitor use are reflected in such controls as the established carrying capacities, length of stay and means of access. This limited purpose is, therefore, focused on the immediate problems and while, hopefully, all management needs are identified only those which solve existing problems are emphasized.

Since park management planning has not been done before by the State Parks Division, a certain amount of trial and error is expected before a workable overall management system evolves. At the same time, there is also a need to begin consideration of expanding or relocating park facilities and providing access and other facilities to coastal areas

which are now inaccessible. To satisfy this need the Na Pali Coast Management Plan will be evaluated within two years. The purpose of this evaluation will be to make any desired major changes in the management of the area and initiate further research and planning for future park programs.

II. Overall Park Management

The purpose of this section is to review the existing conditions, identify management needs and develop an overall management rationale for the Na Pali Coast State Park. First the basic recreation resources will be identified and park boundaries will be recommended based on these resource values. Then the three basic components of any park management plan, namely resource management, visitor use management and park services management will be addressed as they apply to the park. These components and their respective subcomponents will first be looked at from the component's perspective of the total park management rationale. Later, in Section IV, the management needs will be brought together for each geographic unit.

A. Recreation Resources

In any future, widely accepted evaluation of Hawaii's scenic and natural treasures the Na Pali Coast is expected to rank very high. Its archaeological values are also considered to be of statewide value and the whole park area has been nominated to the National Register of Historic Places. The National Park Service recognized these nationwide park values in attempting to establish a national park here in the 1960's.

The Department of Land and Natural Resources Recreation Handbook, March 1978, lists seven major recreation resource objectives for State Parks. Five of these objectives occur on the Na Pali Coast. It is this combination of major values which makes the recreation area so outstanding.

Scenic Heritage

The variety of landscapes along the coast is vast and is not intruded by manmade structures. Vistas include broad expanses of ocean, steep wave-cut cliffs, fluted ridges, deep, narrow valleys, waterfalls, white sand beaches and vegetation of various composition and diversity.

Natural Heritage

Natural features of value along the coast include

the geology of the eroded cliffs and valleys, beaches, and land and water ecosystems. The geologic features are recognized as some of the most outstanding in the state. The land and water ecosystems contain native and exotic flora and fauna. The limited accessibility of the region has minimized any major modification of the natural features in the recent past, except for the spread of exotic plants and animals. A portion of the potential park has been nominated as a Natural Area Reserve. Ample interpretive opportunities exist for native ecosystems and ethnobotany related to the cultural heritage.

Cultural Heritage - The history, archaeology, and mythology of the Haena-Na Pali region dates at least as far back as 1200 A.D. Today, Hawaiian artifacts, once cultivated landscapes, prehistoric structures, legends, and beliefs are indicative of our rich cultural heritage. The proposed Na Pali Coast Park boundaries are entirely within the Na Pali Archaeological District nominated for the National Register. At the heart of the archaeological district is Kalalau Valley, one of the best preserved valleys in the state. Archaeological features include complex and ubiquitous agricultural remains, indications of residential areas for chiefs, and a spectacular heiau. This valley would be a unique laboratory for the study of prehistoric Hawaiian culture, for the preservation and presentation of archaeological remains and as an archaeological bank for future reference and research. The other major valleys also contain evidence of Hawaiian agriculture and habitation. In Haena State Park, adjoining the Na Pali Coast, the complex at Ke'e Beach, consisting of Lohi'au's Dancing Platform and "House", and Ka ula a Paoa Heiau, represents a set of ancient Hawaiian activities seldom found together in one locale: religious, habitation, and agricultural activities, the hula and its association with the goddesses Pele and Laka.

Wildland Recreation

A wildland area is a track of land in an undeveloped condition in which the presence of man in the environment is substantially noticeable. The presence of man can be in the form of visual, sound, and smell intrusions and can be either within or outside the area. Along the Na Pali Coast evidence remains of prehistoric and early historic agricultural terraces and stone structures which were constructed in the floodplains and at bases of cliffs. Today, preservation of the natural features is more important than

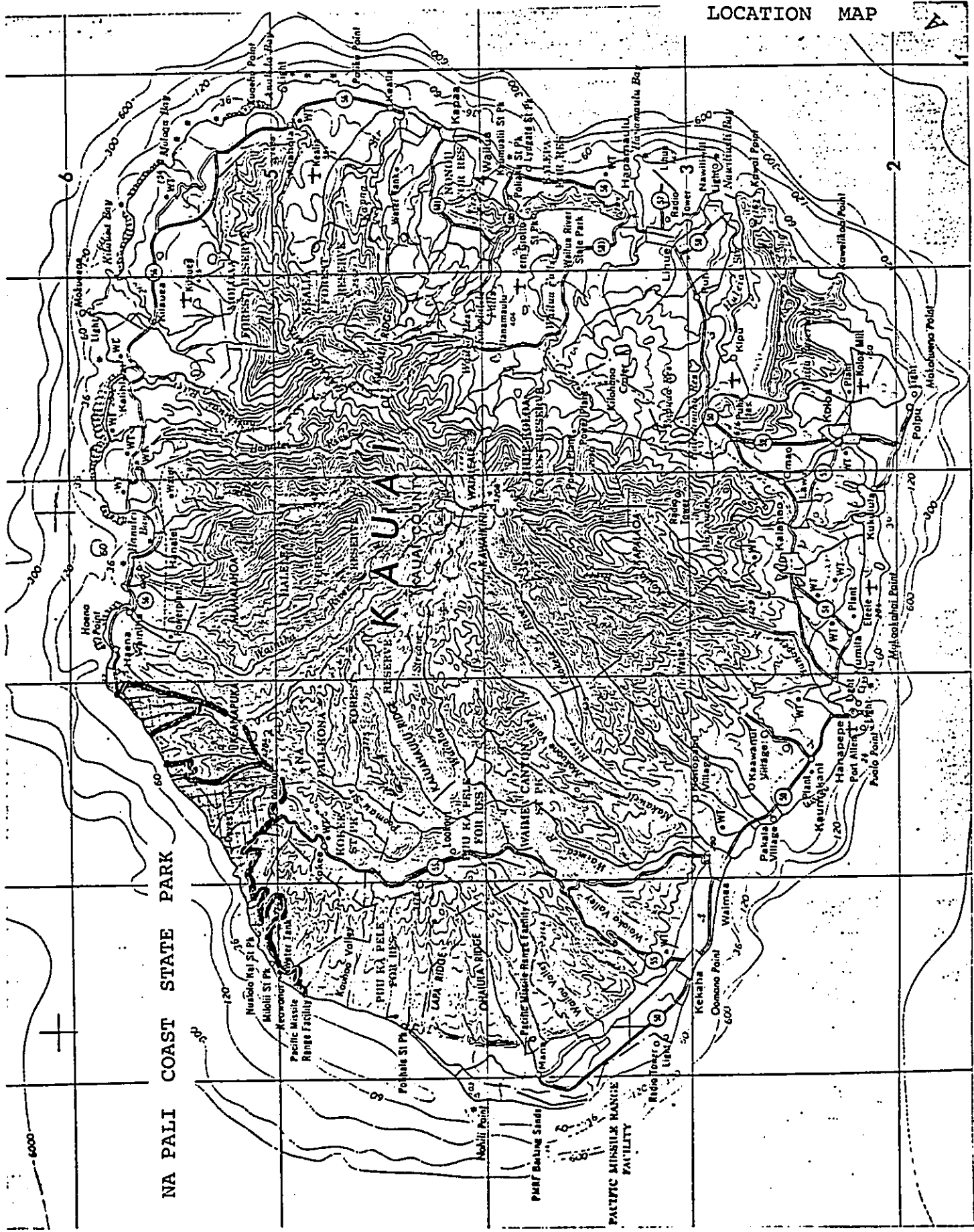
their modification for agricultural, religious, economic or other purposes. The major concern for a wildland recreation experience is that the area must provide opportunities for isolation from the sights and sounds of man's modern facilities and minimize evidence of other users. The Na Pali is well suited for typical wildland recreation activities including hiking, backpacking, camping, fishing and hunting. Its sandy beaches and scenic setting add much to its exceptional wildland recreation value.

Marine Recreation - The coastal waters and reefs support a variety of activities including swimming, diving, snorkeling, fishing, and boating. Consumptive opportunities also have limited commercial value but Kauai residents have traditionally fished in the area for supplemental food. These marine resources add considerably to the recreation experience when combined with the other recreation resources.

B. Park Boundaries

While the entire Na Pali Coast watershed is of high recreation value because of its wildland recreation and scenic heritage values, the entire watershed does not need to be part of the Na Pali Coast State Park. The main park management concern in establishing the park boundaries is that all areas accessible to the public be under the jurisdiction of the State Parks Division. This simplifies visitor management responsibilities and enforcement. Thus the coastal areas and valley floors are all to be within the State Park jurisdiction. The pali lands will continue to be managed by the Division of Forestry, either as part of the Na Pali-Kona Forest Reserve or through a management agreement with the State Parks Division as part of the Na Pali Coast State Park. The park area as shown on the accompanying map contain approximately 6,500 acres of land.

From Haena to Kalalau Valley, the entire Na Pali Coast watershed will be taken out of the forest reserve. A major, central portion of this area is being placed in the 3,150-acre Hono O Na Pali Natural Area Reserve. The upper portion of the reserve mauka of the 1,200 foot elevation is to be managed by the Division of Forestry while the makai area will be managed by the State Parks Division. The entire Na Pali Coast area will also remain a public hunting area under Fish and



LOCATION MAP

NA PALI COAST STATE PARK

KILAUEA POINT

KILAUEA POINT

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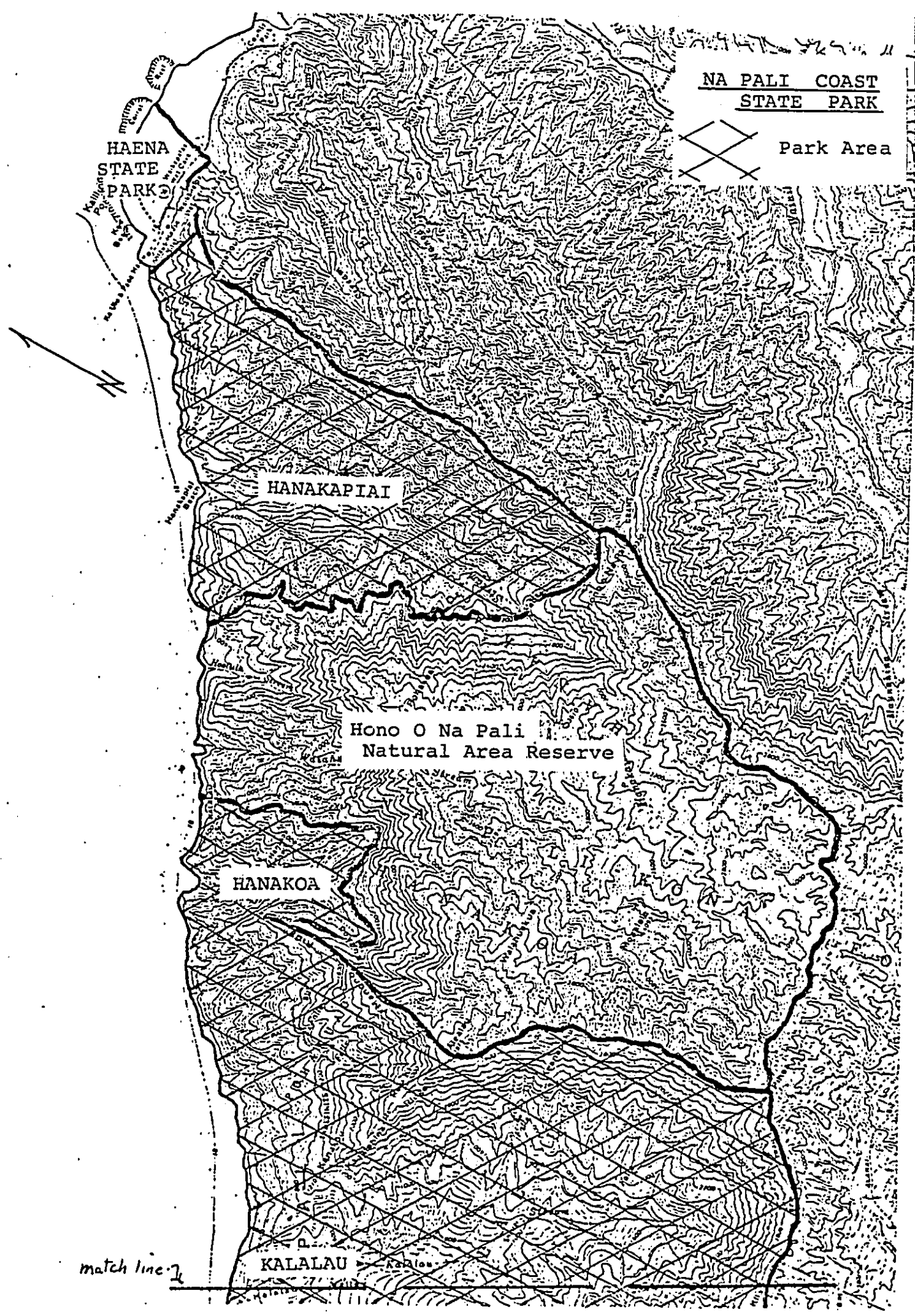
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NA Pali COAST STATE PARK
 KILAUEA POINT
 PACIFIC MISSILE RANGE FACILITY
 KILAUEA POINT


KILAUEA POINT
 PACIFIC MISSILE RANGE FACILITY
 KILAUEA POINT

KILAUEA POINT
 PACIFIC MISSILE RANGE FACILITY
 KILAUEA POINT

KILAUEA POINT
 PACIFIC MISSILE RANGE FACILITY
 KILAUEA POINT



NA PALI COAST
STATE PARK

 Park Area

HAENA
STATE
PARK

HANAKAPIAI

Hono O Na Pali
Natural Area Reserve

HANAKOIA

KALALAU

match line



match line

KALALAU

NA PALI COAST
STATE PARK

Park Area

HONOPI

NUALOLO

MILOLII



Game Regulation No. 29. The portion of the Hanakapiai watershed not placed in the natural area reserve will be included within the park boundaries. The entire Kalalau watershed will also be within the park sharing a common boundary with Kokee State Park at the rim of the pali. In the series of hanging valleys and beaches between Kalalau and Makaha Point the park boundary generally follows the 1,000' elevation contour which limits the park area to the coast and valley floors. The park boundaries will be established by executive order as part of the implementation of this plan.

C. Resource Management

1. Archaeology (See Appendix B - Archaeological Summary Report)

The 1979 Archaeological Reconnaissance Survey of the Na Pali Coast revealed that archaeological features occur on all developable land areas that were surveyed. It is therefore assumed that any area on the Na Pali Coast which can be developed for recreation will contain archaeological features. In the valley interiors these features are largely associated with agriculture. Along the coastal areas where recreation opportunities are greatest, archaeological features associated with early habitation areas are also concentrated and it is these habitation sites which require the most intensive archaeological research.

The most important preservation consideration in managing the Na Pali Coast State Park is the preservation of its cultural heritage. The archaeological features generally occur where park visitors congregate and must be protected from accidental harm as well as from vandalism, pot hunting, and natural weathering. Stabilization of features is not a major consideration in these extensive archaeological complexes.

Unfortunately, it is not feasible to establish an interpretive program in this wildland area. The limited volume of visitors would not justify a well developed program and such a program may not be compatible with wildland heritage values. Self guided tours could be developed to view features which can be readily identified but experience has indicated that vandalism of features can then become a serious problem unless there can be a close

surveillance. Thus interpretive programs will be limited to general written material about the cultural history of the area. It may also be possible to develop on site interpretive programs at Haena which would demonstrate the kinds of features found along the Na Pali Coast.

Where intensive recreation use is desired activity centers will be located away from the most important sites. If at all possible, facilities will be located in spots where there are no features although these building sites may be within an archaeological complex. Intensive use areas will require archaeological surface surveys and some salvage work as indicated in Section IV of this report.

It should be emphasized that the 1979 reconnaissance survey to identify cultural resources was only an initial effort. The development of an archaeological research program is integral to the successful management of the cultural remains with continuing library and fieldwork providing a framework for future planning decisions. Any future archaeological research plan will be submitted to all interested parties for review.

2. Natural Resources

Flora - (see Appendix C - Botanical Reconnaissance Report). The majority of the vegetation on the arable valley floors is exotic and is in an unstable transitional change from previous agricultural or pasture use to an unknown, unmanaged climax ecosystem which may be dominated by exotic plants and except for Hanakapiai, tempered by the grazing habits of goats. The main value of any botanical survey or research on these valley floors where visitors concentrate will be to study exotic plants and their impact on the environment rather than protect native species. Consequently, the baseline survey outlined in the 1979 botanical reconnaissance report is considered a low priority project which can be developed gradually. For the near future it seems more feasible to continue to monitor the area periodically with reconnaissance surveys similar to the wildlife photo station and enclosure system already established for the leeward portion of the Na Pali Coast.

Where significant native species exist and are likely to be affected by visitation, a baseline survey should be established and monitored. The identified areas where this occurs include Honopu Beach, several hanging valleys between Kalālau and Hanakoa Valleys, the valley heads of Hanakoa and Hanakapiai, and the areas along the trail between Hanakoa and Hanakapiai Valleys. Inaccessible areas with significant native species should also be monitored but no protection is warranted except for some fire control and goat management.

Wildlife - (See Appendix D - Fauna Survey Report). The wildlife as well as the vegetation is mostly exotic and does not need a high level of management. The only identified exceptions are some native sea birds and amphibious marine life.

The main existing wildlife management concern is the control of goat populations which exist from the Hanakoa area to Milolii. Too few goats reduce hunting opportunities and allow the vegetation to proliferate while too many goats can cause overgrazing and its associated soil erosion problems. Since hunting is the only practical way to control goat populations, the existing public hunting program should be continued to keep goat populations within the carrying capacities of the areas they graze. Since hunting is also a recreation activity, goat populations should be maintained near the maximum numbers within these carrying capacities. Hunting, however, may be incompatible with many other recreation activities and should be managed in a way that will minimize these conflicts. Hunting recreation activities and needs are not well known for Na Pali Coast and better information could result in improved management of the hunting activity.

Marine Life - (see Appendix E - Marine Survey Report). Knowledge of Na Pali Coast marine life is limited to a one week survey conducted in June, 1979. This survey indicates that the marine life habitat from Hanakapiai to Nualolo Aina is rather poor except for the shoreline splash zone which supports a good supply of organisms such as opihi and pipipi. Within this section of the coast the nearshore was devoid of coral reefs and the sandy bottom, lava rock and smooth boulders offered little shelter for marine life.

The Nualolo Kai and Milolii areas, on the other hand, display a moderate quantity of marine life in their extensive reef areas. Nualolo Kai is particularly attractive for recreation use because of the clarity of the water, greater diversity of marine life and protected waters of a relatively large cove. This cove offers excellent opportunities for fishing and snorkeling and provides ample offshore boat anchorage. The increasing popularity of snorkeling as indicated by the increasing use of such areas as Hanauma Bay, could be a strong attraction resulting in an increased visitor attraction to Nualolo Kai in the future. In contrast the Milolii reef flats are relatively barren and silty. The water is also somewhat turbid and there is no cove at Milolii to protect boats and snorkelers from the hazards of currents and surf by the open sea.

Like most reefs, natural hazards such as pot holes, sea urchins, moray eels, sharp corals and unstable footing occur near the surf zones and reef edges. Nualolo Kai is fairly well protected from normal summer surf but the strong ocean currents and high surf during storms and normal winter surf conditions apparently present serious hazards.

It has been recommended that the present utilization of the marine resources be continued but there is no clear indication of what this present utilization is. It seems fairly certain that the use is quite low because winter surf normally makes the reef unaccessible from October through April and access to the Milolii and Nualolo Kai areas is difficult any time of year since there is no trail access. Other more accessible areas of comparable quality reportedly exist on Kauai.

No change is proposed at this time in the existing marine life management and fishery regulations. Periodic monitoring of marine life will continue and means of obtaining information about user activities associated with marine life will be explored. In the future the cove and reef complex at Nualolo Kai may require additional protection from users, possibly by establishing a marine life conservation district.

Freshwater - (see Appendix F - Freshwater Survey Report). The Na Pali Coast streams are of interest to naturalists because they are among the relatively few streams in Hawaii which still flow unimpeded into the ocean and most are perennial. Surveys conducted in 1965, 1966 and again in 1976 and 1977 indicate these streams contain many endemic species although exotic fauna are apparently moving into these streams and altering the previous interrelationships among organisms. These streams are too small and precipitous to be considered major fishing streams but a disproportionately high ratio of juveniles to adults strongly suggests some degree of regular harvesting.

A 1979 or 1980 freshwater aquatic fauna survey of the four largest of the perennial streams; Hanakapiai, Hanakoa, Kalalau and Nualolo Aina, indicate these streams have a high natural quality and rich diversity of native macrofauna. However, Milolii Stream, the only other stream recently surveyed, was almost devoid of life because of heavy silt loads apparently caused by earth moving activities along Milolii Ridge. The relatively low populations comprised primarily of small immature animals indicates fishing should not be encouraged. If these streams are to continue to be of value as scientific and educational examples of Hawaiian freshwater biota, consumptive use may have to be curtailed or eliminated.

D. Visitor Use Management - (see Appendix A - Visitor Use Data)

1. Need to Accurately Determine Existing Use

Public recreational use of the Na Pali Coast is now man's only use of the coast except possibly for some periodic commercial fishing. As might be expected in a popular wildland area, the major management concern involves the preservation of this retreat from the hustle and bustle, and gadgets found in modern society. For even in a wildland area there is a demand for modern means of access and for portions of the Na Pali Coast which are inaccessible by any means of overland transportation, including hiking, modern means of access is essential for public use. However,

increasing numbers of visitors and modern means of access could destroy the wildland values most visitors are seeking so some effective means of restricting use is essential. But before effective use restrictions can be established it is necessary to have an accurate estimate of existing use.

A number of records are available to measure existing visitor use. These records and their merits are indicated in the following list. A more detailed evaluation of visitor data is included in Appendix A.

- . Camping permits are required for all overnight stays and day use permits are also required for park units where day use is allowed, except at Hanakapiai. Theoretically, this data should provide reliable visitor population counts but periodic actual counts are necessary for each park unit in order to determine the number of visitors who do not have permits (and thereby violated park regulations) and the number of people who did not use the permit they obtained. No actual count data is available. In the summer of 1979 field checks indicated less than 5% of the campers did not have permits while at least 15% of the campers did not use their permits. These field checks were limited largely to Kalalau.
- . A mail survey was conducted from a random sample of permittees to determine visitor use and visitor satisfaction. The 40% response rate gives some indication of use and visitor concerns but it cannot be assumed the non-respondent's response would be similar. The mail survey could be improved with follow-up and supplemented with on site interviews.
- . The enforcement officers reported on citations for violations of department regulations in 1979. During the summer of 1979, they patrolled the Kalalau area for a total of 23 days but as yet there are no regular year around patrols for the entire park.

- . Commercial boat and helicopter operators are required to provide the number of passengers carried and where they are picked up and/or dropped off in the park. The inflatable boat service provided this data in 1979 and the helicopter services will be providing this data when passenger pickup and drop off services are resumed. Spot checks can be made to verify the data and audits of the operators records will be required.
- . The number of hunters and fishermen is not well known but as has been indicated, this information is desired. The hunter use should be the easiest to obtain since hunting licenses and goat hunting permits are required.

The current visitor use data available for the Na Pali Coast Management Plan only provides rough guidelines for visitor use management and should be refined so the management can be improved. Monitoring visitor use will be particularly important in evaluating changes proposed in the management plans and making changes in the specific park management policies in response to changing needs for both the visitors and the park resources.

2. Population and Length of Stay

An accurate knowledge of visitor population is necessary to assess visitor impact on park resources and determine facility and maintenance needs. Data from the peak use period during the summer of 1979 indicated that the average number of visitors per day was well below campground carrying capacities established by the interim management plan with one exception. During the months of July and August, Kalalau campground was often filled to capacity. According to undocumented counts from the Lihue office, during July and August, 1979, an average of 12 persons per day were refused permits to Kalalau campground because this campground reached its capacity on 3 days during July and 22 days during August. In contrast to the Kalalau campground, the Milolii and Nualolo Kai campgrounds where access was almost entirely by private boat in 1979, were apparently underused even in the summer months, although no actual counts were made to confirm the permit data.

During the winter months of 1979-80, visitor use was less than half the peak summer use according to the permit data. Surveillance was also greatly reduced during the winter so the accuracy of the permit data as an indicator of actual use is less reliable. Poor weather is more of a factor in the winter and is expected to reduce actual use. On the other hand, the lack of surveillance is expected to increase permit violations resulting in an increase in unauthorized use.

The length of stay indicated on the permits was consistent, when averaged out for all survey respondents, with the length of stay indicated in the mail survey responses so this information is considered to be fairly accurate. The significance of this data in managing the use of the Na Pali Coast will be dealt with in other sections of the plan.

3. Means of Access

While specific park unit access recommendations are included in the unit management plans in Section IV, the rationale for the access to each unit is included in this section in order to present an overall access program.

Considering the expressed public concern regarding helicopter and commercial tour boat landings and the number and type of visitors using these services, access needs for each park unit must continue to be carefully evaluated. There is also a need to determine what facilities are required at the Kalalau Trail head in Haena State Park to serve Na Pali Coast hikers and campers.

During the summer of 1979 the use of helicopters was prohibited for picking up and dropping off campers and day users but unrestricted use of helicopters was being made for reststops at Milolii and Kalalau campgrounds. Undocumented estimates indicate Milolii was heavily used (10-15 landings per day) while Kalalau landings were limited to less than one landing per day. This situation provided an opportunity to assess the need for helicopters as a means of access and their impact on the campground area. However, the demand for helicopters and the impact of the day users and campers they brought in previous years could not be evaluated as part of the 1979 interim plan study.

A commercial, inflatable tour boat was operating from June through mid-September, 1979, landing almost exclusively at Kalalau. While this service brought in less than 10% of the Kalalau visitors it carried out about 25% of the visitors according to permit and boat operator records.

Since Hanakapiai can be easily reached by an hour's 2-mile hike and typically receives a large number of day users, access can be limited to hiking only. Hanakoa access can also be limited to hiking. It is not normally a destination area, serving primarily as an overnight campground for hikers unable to hike the 11-mile Kalalau trail in one day.

Kalalau, the only campsite to reach its arbitrary carry capacity limit in the summer of 1979, can be limited to hiking access only at least during the summer. However, a significant number of the 1979 summer visitors found the inflatable boat service a convenient way to return to the North Shore area, and the physical condition of some hikers made the return trip by trail inadvisable. But this convenience needs to be weighed against the significant number of complaints received regarding these commercial activities.

At the present time a limited commercial access seems to be desirable. Limits should include restrictions on the number of visitors allowed to be carried per day and limited landing hours. The services should be for campers only which would eliminate the use of Kalalau for reststops or day use. In the summer, commercial access by inflatable boats only be considered as a future option. During the winter months when boats cannot the service could be performed by helicopters. If this limited commercial access is too intrusive for the majority of campers, it could be eliminated after a trial period.

The Nualolo Kai and Milolii campgrounds cannot be reached by trail and both were underused in 1979 according to the recorded use for these areas and estimates of use from previous years. Commercial tour boat landings were available at Nualolo Kai but only three visitors used this service in 1979 so the only other access to these two campsites was by private boats. Previously, campers and day users were landed at the Milolii heliport but in 1979 access was limited to private boats.

Both campgrounds require commercial access. Milolii can be used for both campers and day users with limits on the number of visitors per day and limited landing hours. Commercial access to Milolii will be limited to helicopters operating from a helipad located away from the campground as far as possible. Nualolo Kai is a much smaller area, lacks a source of potable water and contains a wealth of archaeological material so use of this area should be very limited. Access will, therefore, continue to be restricted to boats only. This in effect means the park will only be open during the summer months when sea conditions permit boat landings. Use by commercial tour boats may increase since it will be the only authorized landing for day users. Private boats are expected to continue to land at both park units.

Another popular, previously used helicopter drop off area is at Honopu Beach. This area is also inaccessible by trail but is often reached by swimmers from Kalalau when the sea is calm and in some summer season conditions is accessible to waders. Since storm waves reach the entire developable area, no public facilities are feasible and no public access or use is being encouraged.

Access controls combined with a permit/reservation system are the main means of controlling visitor use. This control system limits the availability of the park to the casual, unplanned visit, but there seems to be no alternative if the wildland experience is to be preserved.

In addition to commercial access for day users and campers visiting the park, access has also been requested to provide a reststop for helicopter tours. Helicopters provide a spectacular way to view the scenic values of the Na Pali Coast as part of an hour's flight around the island of Kauai. For flights from Lihue, the Na Pali Coast is also a halfway point in the tour and the four existing helicopter companies all feel there is a need for passengers to disembark to "stretch their legs" and get away from the noise and vibration of the helicopter for 10-15 minutes. As part of the interim management plan, helicopter landings were limited to reststops only at the two currently licensed helipads at Milolii and Kalalau.

In order to minimize the intrusion of helicopters into the wildland experience, reststops will only be allowed at Milolii at this time. If other reststop sites are considered in the future, a heliport at Nualolo Aina or other isolated valley areas will be considered since these valleys avoid any of the intensive developed areas in the park while providing a glimpse of a scenic, narrow valley with its complex of Hawaiian agricultural terraces.

4. Adequacy of Visitor Control System

The need for a visitors control system was indicated as part of item 1 in this visitor use management section. The present visitor control system was established in February, 1979, as part of the Na Pali Coast Interim Management Plan. This system was based largely on the previous years field experience and is now being checked with visitor use data as well as additional experience. By comparing the visitor permit data with the mail survey the following observations have been made:

- . Some permittees stay fewer or more days than the length of time stated on the permit. However the mail survey indicates the average visit period is only slightly longer than the average visit period indicated on the permit.
- . Approximately one quarter of the survey respondent groups contained fewer or more people than stated on the permit but the average number of visitors per permit was only slightly larger than the average indicated from the permits.
- . A large majority of the survey respondents destined for Kalalau did not follow the campground assignments specified on their permits. Most respondents were scheduled to camp at Hanakapiai and/or Hanakoa enroute to Kalalau but apparently either underestimated or overestimated their hiking time. No clear trend of overuse and underuse of each of the three campgrounds could be determined.

In general the visitor control system is probably effective and most variations in use from that indicated on the permits average out. The data indicates that the initial control of visitors before they enter the park is the most effective. Once visitors have entered the park they adjust their plans considerably as the need arises. Providing visitors with better information about the park so they can make more accurate plans should be the first step in reducing this problem. An information center at Haena has been suggested.

Enforcement of the control system was apparently adequate during the summer of 1979 but a reduction in surveillance after the summer session has probably led to increased violations, largely by visitors camping without permits or staying beyond the 5-day limit. This is difficult to confirm and enforce without more frequent trips by staff members but relatively lower use rates according to the permits indicates the areas are probably being kept well within their assigned user carrying capacities.

5. Visitor Health and Safety

Any wilderness or wildland area has more inherent dangers to visitors than the usual developed park. In fact part of the wildland recreation experience involves being able to identify and cope with the

hazards found in these primitive areas. While the State Parks Division cannot be expected to provide facilities or surveillance which would substantially reduce these dangers, the common hazards should be identified and made known to visitors as part of a park information program. Emergency services also need to be planned to clearly establish agency responsibilities and minimize time and confusion in responding to an emergency. A record of emergencies requiring emergency services should be kept to help determine any patterns in types of emergencies and their circumstances. Spot checks on hikers to Kalalau indicate serious blisters, sprained ankles, plain fatigue and fear of heights are main reasons given by hikers for not hiking out as planned.

6. Visitor Satisfaction

The outstanding natural heritage values of the Na Pali Coast make this area particularly sensitive to any contrasting actions by man which detract from this natural beauty. Visitors satisfaction is inherently a personal determination but typically there is a concensus of certain likes or dislikes related to the way the area is managed. The visitor mail survey provided the main means of determining visitor satisfaction. Each permittee surveyed was simply asked what likes or dislikes they had regarding their visit. The most frequently expressed likes and dislikes are as follows:

- . The most frequent response of all was that the area was beautiful, tranquil and unspoiled and the visitor would like to come again.
- . The second most frequent response was a dislike of helicopter activities although there were a few respondents who favored helicopters. Inflatable tour boat activities were also disliked but not to the same degree as helicopters.
- . The amount of trash and poor campground maintenance was also a major concern, but it varied somewhat from month to month.
- . Other dislikes mentioned several times were the area was too crowded; there was a parking/car security problem at Haena or a shuttle bus to the Kalalau Trail head was needed; permit restrictions were a problem and getting the permit was inconvenient; hunting was disliked

and some hunters left messy campsites; and permit enforcement was sometimes lax.

The major dislikes are all concerns which can be minimized or eliminated with good management. Most reflect the need for further user or access restrictions, additional maintenance and enforcement and improved public information. Section IV of this plan will recommend the combination of management tools which will best provide for the maximum use of each unit while preserving the wilderness type experiences being sought by the survey respondents. Unsolicited correspondence and public meeting response also reflects these same concerns but further surveys are required to obtain a better sampling of park users and their reactions to any management policies being applied.

E. Services Management

1. Assignment of management responsibility

The primary responsibility for the management of the proposed Na Pali Coast State Park is assigned to the State Parks Division, Kauai Parks Superintendent. This management responsibility will operate within the Department of Land and Natural Resources policy guidelines as reflected in the management plan or by other directives. Technical services will be provided by the head office of the State Parks Division and by other agencies as established by formal or informal agreements. The State Parks Division will be the lead agency directing and coordinating all agency activities and assuming the responsibility for all unanticipated management needs.

2. Cooperating agency services

The Na Pali Coast is owned entirely by the State of Hawaii except for the completion of a condemnation procedure on one parcel and there are no leases, permits or easements encumbrances on this land. Most of the land is part of the Na Pali-Kona Forest Reserve managed by the Division of Forestry although the beach areas at Nualolo Kai and Milolii have been managed by the State Parks Division even though they are within the forest reserve. The entire area is also part of a public hunting area as established by Regulation 29 of the Division of Fish and Game. In 1974, the lower Kalalau Valley lands and Pohakuao coastal area which were not part of the forest reserve were assigned to the State Parks Division by Executive Order 2724. In August, 1979, the establishment of Hono O Na Pali Natural Area Reserve was authorized

on a portion of the windward section of the Na Pali Coast and an executive order is being processed to fulfill this authorization.

A memorandum of agreement established July 25, 1979, assigned Na Pali Coast management responsibilities among four divisions within the Department of Land and Natural Resources. The agreement was cancelled with the adoption of this management plan but many of the existing responsibilities were retained as part of the plan. The primary responsibility of the State Parks Division is to continue as the lead agency and manage the recreation use and user facilities. For the management of the flora and fauna, the expertise from the Division of Forestry and Fish and Game continues to be relied upon. All enforcement responsibilities have recently been centralized in the Division of Conservation and Resources Enforcement. The specific division responsibilities within the Department of Land and Natural Resources are given in Section III as part of the management objectives.

In addition to retaining close coordination among divisions within the Department, coordination is also continuing with the Kauai County emergency services involving the Civil Defense Agency, Fire Department and Police Department. Coordination with the State Health Department is also being continued to assure compliance with health regulations.

3. Staff Requirements

At the present time there is no full time staff assigned to the Na Pali Coast. The one park caretaker assigned to Haena does maintain the Hanakapiai campground and trail from Haena to Hanakapiai however. The remainder of the maintenance work is generally provided by work crews from West-Kauai. Summer students also comprise a significant portion of the total existing work force.

Concern expressed by the State Department of Health and by the visitors themselves provide strong evidence that both campground and trail maintenance must be improved. Visitor satisfaction data also indicates enforcement should be improved. Additional trail maintenance responsibilities, previously assigned to the Division of Forestry, are being added to the State Park Division workload as part of this management plan.

Staff requirements are largely based on the amount of public use and the maintenance standards required for various facilities. Unfortunately, there are no existing maintenance standards so standards will have to be developed. Health standards for primitive facilities would be helpful in determining needs for toilet maintenance and trash removal. Trail maintenance can be estimated based on past experience and revised on the basis of more experience and better records. State Park administrative time including recordkeeping, public contacts and staff supervision can also be established and revised based on additional experience.

Section IV of this plan includes the staff needed to manage the visitors and facilities located at each park unit. A summary of these staff needs is given below as well as the general administrative and recordkeeping staff needs:

Total Na Pali Coast Operating Staff

. DOCARE Enforcement	Planned	Existing
Hanakapiai	130	130
Hanakoa	4	2
Kalalau	108	60
Nualolo Kai	5	5
Milolii	<u>48</u>	<u>3</u>
Total Man Days Per Year	295	200
. State Parks Maintenance		
Trail Maintenance	196	18
Hanakapiai	351	156
Hanakoa	192	24
Kalalau	504	324
Honopu	23	13
Nualolo Kai	90	60
Milolii	<u>261</u>	<u>168</u>
Total Man Days Per Year	1,617	763
. Overall Recordkeeping/Issue Permits		
Total Man Days Per Year	160	120
(200 Man Days = 1 Man Year)		

In addition to the regular park operating staff research and monitoring will be done by the head office staff from various divisions and/or consultant services.

The management plan is based on the assumption the planned staff and associated funds will be made available. However, it is recognized that neither the manpower or the operating funds can be fully guaranteed. Any reduction of staff or associated funds will require a reduction in services. In the case of trail maintenance priority will be given to the main Kalalau Trail while the spur trails will be given a lower priority, a lower standard of maintenance, or they will be closed. Camping area maintenance must at least meet health standards and if unsanitary conditions cannot be coped with the number of visitors will either be reduced or the unit will be closed until standards can be met. Alternatively, in the future, the sanitary facilities could be improved or increased in numbers to increase the number of visitors. Enforcement and recordkeeping are the keys to improved management of the park.

4. Staff Field Operations

High transportation costs create special operations considerations for the Na Pali Coast. These costs are either in terms of money for the use of commercial access or in terms of large amounts of manhours spent in hiking or operating the State Park boat.

To reduce transportation costs field crews will normally stay on the coast for a full work week or until the job was done. The base camps established at a workshed in Kalalau campground and the cabin at Milolii will continue to provide employee temporary living quarters supplemented with tent camping at other campgrounds as needed. Because of the access problems and wildland values no permanent caretaker residences will be established. During the peak use summer season daily campground facility maintenance is needed at heavily used campgrounds and staff work weeks will be adjusted to assure minimal weekend coverage as needed. During the remainder of the year work schedules will be reduced but each campground

open to the public will be checked at least twice a month.

User surveillance will continue to be carried out informally by state park supervisory staff during normal maintenance trips. Where radio communication can be established limited emergency services will also be added to their responsibilities. The work of enforcement officers is particularly hampered since lack of access, except by commercial helicopters, prohibits spot checks. When feasible use of the state park boat may provide the best access for surveillance and avoid complete reliance on commercial means of access. Closer surveillance is required during peak summer use periods and the hunting season but some infrequent surveillance is also required throughout the rest of the year. Establishing periodic checks at the trailhead at Haena and at Hanakapiai may reduce the need to patrol Kalalau. The need for surveillance at Milolii and Nualolo Kai is not expected to be very great as long as commercial means of access are carefully monitored.

Section IV of this plan includes the staff overnight stays and transportation requirements for those units which are expected to require it. The totals are as follows:

	planning	existing
Total overnight stays per year	394	210
Commercial trips per year	83	59

5. Concession Operations

Concession operations will be limited to helicopter and inflatable tour boat access. Leases will be drawn up for each operator and include the conditions for landing and picking up park visitors as indicated elsewhere in this plan. In addition to the licensed heliports and designated boat landing areas established for commercial, public access, other landing sites will be maintained for park operations and emergencies. No facilities of any kind will

be provided for the concession operations. The licensed heliport areas will be identified and kept clear for the convenience and safety of the visitors. Use of the commercial services for transporting staff, supplies and trash will be on a standby basis to reduce costs. If feasible, emergency radio communication will be coordinated with the helicopter operator's radio systems.

F. Future Planning Needs

As indicated in the introduction, this management plan focuses on managing traditional areas used for recreation and existing kinds and levels of recreation. While this plan is expected to resolve the key user needs and protect the park resources, the management of the Na Pali Coast can be strengthened by additional resource and visitor use information and planning. These studies would also identify potential opportunities for altering existing visitor use by considering new or alternative locations and different recreation experiences.

The Na Pali Coast resource inventory should include a study and description of the area's exceptional scenic values as seen from the land, sea and air. Visual resource management objectives can then be established. A related but separate study should be undertaken to inventory and evaluate the geologic and physiographic features. These features may have both interpretive and scenic values which can be enhanced for the visitor. They were not included in this management plan because protection of these features was not a significant concern. An inventory of all recreation activity resources should also be made including existing and potential trail routes, waterfalls, freshwater swimming pools and beaches. In identifying these resources, associated hazards to visitor use should also be indicated.

The inventory of recreation activity resources would obviously provide the basis for future park development. This does not necessarily imply increasing use of the Na Pali Coast but should involve a greater diversity of locations to visit and recreation opportunities to experience. There is also a need to evaluate the recreation resources of the Na Pali Coast with the recreation values of other parks and public lands which offer similar recreation opportunities in Hawaii. Unfortunately none of these areas have been adequately evaluated to determine relative

values. If this was done it would allow us to manage the Na Pali Coast so that only those opportunities best suited to the area would be emphasized.

III. Recreation Management Objectives

This section has been developed in an attempt to establish clear, specific management objectives for the three basic management plan components reviewed and evaluated in the previous section. These objectives form the policy framework for the management services to be provided by the Department in managing each park unit in the Na Pali Coast State Park. They are based on the evaluations given in the previous section or are derived directly from background data found in the appendices. Existing park regulations supplement many of these objectives.

A. Resource Management Objectives

1. Natural Resources

a. Preserve Scenic Values

- . The primary resource management objective for the Na Pali Coast State Park and the adjoining pali lands forming a backdrop for the coastal area is to preserve the scenic heritage. Thus any alteration of the area should be measured in terms of visual contrast with the surrounding natural landscape.
- . Avoid the placement of all manmade structures, such as signs, comfort stations and shelters in locations where their presence will detract from the surrounding scenery.
- . Consider the visibility of all structures from different perspectives, and minimize their visibility.
- . Select building design, building materials and finishes which harmonize with the surrounding natural environment.
- . Refrain from clearing trees, rocks or other natural features including improving the view from vantage points.

b. Preserve Native Flora and Manage All Vegetation

- . In areas where native plants are numerous or rare plants exist which might be threatened by visitor use, a baseline survey will be established. The basis of this survey will be a comprehensive plant inventory.
- . In areas dominated by exotic vegetation baseline surveys will be limited to photo stations and selected sample plots as needed.
- . Where practical, control undesirable exotic plants. In areas where native plants are numerous or rare plants exist control of all exotic plants will be required where practical. In areas already dominated by exotic species control may be limited to destroying exotic species not yet fully established. Special care should be exercised in using herbicides to avoid damaging endangered plants, stream life and archaeological features which may occur in the same general area.
- . Minimize the threat of fire by restricting all camping to designated camping areas, restricting the use of camp fires and making visitors aware of fire dangers.
- . Botanical surveys will be conducted every five years to monitor trends established by baseline surveys and to re-evaluate management concerns. These surveys will be coordinated with wildlife surveys whenever this is feasible.
- . In future planning when establishing any new sites or trails for intensive recreation use try to select sites of minimal botanical value and botanize those areas selected. Botanical surveys shall precede any archaeological salvage or subsurface testing.
- . Establish a research program for the following needs:
 - . The impact of remaining cattle (3 animals) and/or previous pasture use.
 - . The impact of goats on native plants.
 - . A priority list of aggressive, exotic plants and feasible methods of control.

c. Preserve Native Fauna and Manage All Fish and Wildlife

- . Native bird nesting areas will be protected from visitor activities, including disturbances from boats and helicopters. Wild cats will also be controlled to protect birds.
- . Protect all stream life and marine life from any herbicide, pesticide, fertilizer or waste treatment substances which could fall, flow or leach into stream or ocean waters.
- . Should any threatened or endangered marine animals (e.g. Monk seals and green turtles) become regular visitors to Na Pali beach areas, visitors should be informed of the need to avoid harassment of them.
- . Public hunting will be continued pursuant to Regulation 29 of the Division of Fish and Game. Flexibility of management will be possible through the provisions of the regulations involving safety zones, season suspensions and declarations, and public drawings.
- . Public goat management should be continued as a recreation activity and as a means of controlling exotic vegetation, preventing erosion and preserving native vegetation.
- . Goat populations should be kept near maximum numbers which are compatible with the safe carrying capacity of their habitat and public hunting purposes.
- . Wild house cat and rat populations will be controlled as authorized by the Human Society.
- . Public fresh and salt water fishing will be continued under various existing regulations of the Division of Fish and Game.
- . Both fish and wildlife surveys will be conducted every five years to monitor trends established by the 1979 baseline surveys and to re-evaluate management concerns.
- . Establish a research program for the following needs:
 - . Additional freshwater baseline surveys to monitor all streams for stream life.
 - . User surveys on fishing and hunting recreation activities.

2. Archaeology

a. Protect archaeological features

- . Set aside sample areas from any public use for future research purposes.
- . Select areas of relatively low archaeological value for intensive recreation use and restrict intensive recreation use to these areas.
- . Where feasible protect archaeological features from damage by visitors by inhibiting access and knowledge of the precise location of feature.
- . The archaeological resources will be monitored every 3 years to re-evaluate management concerns.
- . Place qualified archaeological complexes on the State and National Registers of Historic Places. This may be done as a single district rather individual complexes.
- . Where feasible, protect archaeological features from natural erosion (e.g., reduce soil erosion, prevent displacement of rocks by vegetation, etc.).
- . Be aware of pot hunting interests and enforce laws prohibiting this practice.
- . Develop an archaeological research plan for the entire Na Pali Coast indicating library research to be done and program priorities. Consider developing a long term summer field research program which includes college students.
- . All archaeological work will be performed under the direction of qualified archaeologists.

b. Where areas are selected for intensive recreation use, minimize any loss of archaeological values.

- . Select sites of lower archaeological value, particularly avoid sites of value to modern Hawaiians, sites of high interpretive value or sites of high research potential.
- . Salvage all sites as necessary to preserve archaeological information but minimize excavations by relocating park facilities whenever possible.
- . In developing park facilities minimize any grading and incorporate to the maximum

extent feasible, any archaeological features found in the site (e.g., agricultural terraces can make good camping or picnicking sites).

. If at all possible avoid the use of rubbish pits and pit toilets by utilizing new technology for sewage disposal in remote areas. If pits are needed try to locate them in areas free of archaeological features.

c. Foster the visitor's appreciation for archaeological values and the rich history of the area with attractive, printed material. Do not identify any specific feature which could be vandalized.

B. Visitor Use Management Objectives

1. Provide Limited Areas of Relatively Intensive Public Use Within the Na Pali Wildland Area

- . Intensively used areas will generally be restricted to the coastal areas where recreation opportunities are greatest and access is easier.
- . Levels of intensity will vary among park units in order to satisfy as wide a range of potential users as possible and also allow some areas to remain inaccessible to most visitors. These intensities of use reflect densities of users. The number of users will also vary depending on the size of the developed area.
- . High intensities of use will not be allowed in the Na Pali Coast State Park but Haena and Polihale State Parks which are accessible by road will allow higher intensities of use in portions of these parks and act as gateways to the Na Pali wildland area.
- . Medium intensity will be established at Milolii where access is limited to boats and helicopters. This level of use will also be maintained at Hanakapiai, if possible, but higher density day use may occur in the Hanakapiai beach area.
- . Light intensities of use will be established beyond Hanakapiai Valley to the end of the trail at Kalalau Valley and at Nualolo Kai.
- . Lightest use will be at Honopu Beach which has no facilities and will be left entirely in its natural condition.
- . No use, except for hunting is expected to be made of the isolated valleys between Kalalau and Milolii.

2. Continue Public Hunting and Fishing Programs

- . Minimize hunting recreation conflicts with other recreation activities during peak summer use periods by rescheduling the hunting season where feasible, reducing the hunting season in specific areas, limiting hunting to bow and arrow in specific areas and/or establishing separate hunting zones. Hunting activity needs will be determined before any changes are recommended.
- . Review Fish and Game Regulation 29 and make any changes needed to implement the Na Pali Coast Management Plan and enforce this regulation.
- . During the hunting season safety zones will be established and prominently posted around all affected, intensively used areas and at the junctions of the main hiking trails. Campers will also be warned of the additional hazards by handouts distributed with their camping permits. Safety zone signs will be removed after the hunting season.
- . Enforce pertinent fresh water and marine fishing regulations.

3. Provide Limited Day Use and Overnight Use Opportunities at Designated Areas Where Minimal Facilities Will be Provided

- . In medium and light intensity use areas along the Na Pali Coast facilities will be limited to pit toilets, rubbish pits and/or containers, the existing shelters and the existing cabin in Milolii.
- . Camping will be by permit only with a maximum number of campers established for each designated camping area. This number may vary among campgrounds. Reservations may be made one year in advance. The maximum length of stay within the entire Na Pali Coast area is seven (7) nights with a maximum of five (5) nights in any one campground, unless otherwise designated. This maximum length of stay is calculated for any 30-day period beginning on the first day of the permit period.
- . Day use will also be by permit only, except that no permit will be required for day use in Hanakapiai.
- . All day use and camping permits will be issued by the State Parks Division through the Lihue Office.
- . All hunters with valid hunting permits will be given camping permits for designated camping areas.

- . Permits are valid only for persons specifically named on the permit.
 - . Permits will not be issued for groups of more than 10 persons for any park unit except for use of the Milolii facilities.
 - . Open fires are not allowed. They must be confined to fireplaces, grills or some type of stove.
 - . A rubbish "pack out" policy will be established. Compliance will be monitored by the field office.
 - . Close certain park areas in the off season where recreation opportunities and means of access are limited by normal winter sea conditions.
4. Provide Limited Access to the Na Pali Coast Wildland
- . Where trail access is available hiking will be given priority over other means of access (i.e., boats and helicopters).
 - . Private and commercial tour boat landings will be limited to designated landing areas. Commercial tour boat landings will be controlled by permits or leases issued to commercial operators through the State Parks Division. All commercial boat operations will be in compliance with State and Federal regulations. Emergency and/or park maintenance landing sites may be established at other locations.
 - . Designated commercial landing sites for boats and helicopters will not be located within intensive public use areas but may be located adjacent to intensive use areas. The sites will avoid any natural or cultural features of value. Landing hours will be established.
 - . Boat routes and helicopter flight paths will be established in order to minimize the disturbance to visitors and wildlife. Low level helicopter flights within the coastal valleys will be prohibited except by special permission or for emergencies. Special use permits may be authorized by the Board of Land and Natural Resources.
 - . All boat and helicopter passengers must have a valid day use or camping permit if they are being dropped off.

- Designated commercial heliports may be established for reststops as well as for picking up or dropping off park visitors, but these reststops will avoid the Kalalau to Haena portion of the park.
- All commercial heliports will be licensed by the Hawaii Department of Transportation. The heliports will be identified on the ground and will be limited to helicopters weighing no more than 5,000 lbs. Heliport size will be approximately 65' x 65'.

5. Provide Information to the Visitors

- Inform potential visitors of the reservation requirements, trail conditions, limited facilities and other information which would be helpful in planning a trip and understanding the reason for use restrictions and minimal facilities.
- Warn potential visitors of the various natural hazards that can be encountered.
- Provide interpretive handouts as this material becomes available.
- Provide a minimum number of signs. These signs will be limited to directional signs and warning signs and will be consolidated where possible.
- Provide information on the various recreation opportunities available, their location and any particular skills or equipment needed.
- Prevent the introduction of exotic plants and animals to the land and streams in part through public information programs explaining the environmental impacts these introduced species may cause.

C. Park Service Objectives

1. Establish and/or Continue Cooperative Arrangements With Other Divisions Within the Department of Land and Natural Resources with Management Interests in the Area

- The State Parks Division will be the lead agency and will assume any unanticipated management needs which are not assigned to agencies. This responsibility includes close coordination with Kauai County agencies and coordination with other State agencies.

. The Division of Forestry will:

- . Turn over the inventory of Forestry improvements for the park area.
- . Continue to provide fire control and technical forest management services.
- . Provide technical staff within the constraints of available manpower, to conduct limited botanical surveys and monitor botanical features.
- . Advise the State Parks Division of the data available for the Na Pali area such as range condition and hunting activities.
- . Continue to provide wildlife management services and manage public hunting activities as established in the plan.
- . Coordinate with the State Parks Division in establishing safety zones during public hunting season and operating a self checking station at the Kalalau Trail head at Haena.
- . Provide technical staff to monitor the wildlife baseline survey at least once every five years.

. The Division of Fish and Game will:

- . Advise the State Parks Division of the data available for the Na Pali area such as marine and freshwater habitat conditions and use for fishing.
- . Continue to provide management services for fishing.
- . Notify fishermen of any changes in the public use of the area.
- . Provide technical staff to monitor a baseline survey of the aquatic life found in the area at least once every five years.

. The Division of Conservation and Resource Enforcement will:

- . Check visitor use permits on a regular basis (e.g., hunting licenses/permits, camping permits). The State Parks Division can help provide access to the coast in coordination with maintenance service trips.
- . Enforce all existing Departmental regulations applying to the Na Pali Coast Area. This includes Historic Preservation Office regulations, Fish and Game regulations, Division of Forestry regulations in forest reserve areas as well as State Parks Division regulations for those areas assigned to State Parks by executive order.
- . Report all visitor contacts made and violations which occurred.

2. Provide Staff to Maintain and Manage the Na Pali Coast

- . Staff members will be assigned to stay in the remote coastal areas for several days at a time, but will not be permanently assigned to live in in these areas.
- . Services to be provided will include maintenance/cleanup of intensive use areas and facilities, trail maintenance, public information, data processing and security patrols.
- . Frequency of services will vary depending on the amount of use, normal deterioration of trails, compliance with any established health requirements for public facilities and available manpower.
- . The overall park management responsibilities will be assigned to the Kauai Parks Superintendent.
- . A pack in/pack out litter control policy will be established and enforced throughout the park.

3. Establish a Data System to Monitor Visitor Use and the Condition of Natural and Cultural Features

The following records will be included:

- . Number of permits/visitors on each permit.
- . Actual periodic check of visitors at each intensive use area to determine numbers of visitors and compliance with permit system.
- . Commercial tour boat and helicopter passengers/trips.

- . Condition of significant natural and cultural features.
 - . Number of complaints and acts of vandalism.
 - . Number and type of emergency search and rescue events.
 - . Enforcement officer records on checks made and types of citations issued.
4. Provide and Manage Commercial Tour Boat and Helicopter Landing Services
- . All commercial helicopter landing sites will be designated and licensed by the Department of Transportation and will be in full compliance with Federal Aviation Administration regulations. Licenses will be issued to the Department of Land and Natural Resources, who, in turn will issue leases to private operators through the State Parks Division. Other landing sites may be established for Departmental management operations, emergencies or special authorized uses.
 - . Establish leases for each company.
 - . Monitor/enforce compliance to the conditions stipulated in the lease.
 - . Arrangements will be made with commercial operators to haul supplies, staff and rubbish. These operators will also be available for emergencies.
5. Provide a Warning System and Emergency Search and Rescue Service for Park Visitors and Staff
- . Determine the feasibility of establishing an emergency radio communication system which can reach intensively used visitor areas. There is no emergency communication system at this time and none is planned.
 - . Post warnings at the trailhead at Haena for large storms and/or high surf conditions that occur or are forecast.
 - . Provide each permittee with information on the normal hazards encountered on the Na Pali Coast. These hazards include high surf, ocean currents, flash flooding of streams, slippery eroded trails, public hunting seasons and lack of potable water. This hazard information will be distributed with each permit and warning signs will be posted.

- . Discourage ocean swimming. No lifeguards will be provided.
- . Monitor the health conditions of sanitary facilities and fresh water supplies. Health standards will be established for sanitary facilities.
- . Review and continue an emergency search and rescue system utilizing commercial boat and helicopter services as well as designated County and State equipment and personnel.

IV. Management Plans by Park Units

Now that management concerns for the overall park have been addressed, this section will focus on the specific management recommendations involving each unit within the park complex. It should be noted, however, that the management objectives from the previous section apply to each unit unless modified in this section, even though these overall objectives are not repeated for each unit. The Na Pali Coast can easily be divided into separate physiographic areas which have different resource management needs and offer an opportunity to provide a range of visitor experiences. The following units include all designated visitor use areas.

A. Kalalau Trail System

The Kalalau Trail begins near Kee Beach at the end of the Kuhio Highway (Route 56) in Haena State Park. The park area at Haena includes approximately 60 acres of developable land at the end of the north shore coastal plain and has a high recreational, historic, and archaeological value. Acquisition of this area for park purposes was completed in 1977 and a separate park plan is to be developed. It is recognized, however, that development of the Haena area must include trailhead facilities for Na Pali Coast visitors.

This 11-mile, highly scenic trail which begins at Haena, extends along the rugged Na Pali Coast as much as 800' above sea level before ending at Kalalau Beach. The present trail is itself a historic site, originally established by late 19th century Hawaiian residents of the Na Pali Coast. Today the trail is a worn dirt path. The sections between Haena and Hanakapiai and between Hanakoa and Kalalau are in fairly good condition while the section from Hanakapiai to Hanakoa is in poor condition. The initial two-mile portion of the trail to Hanakapiai is heavily used by casual day hikers but the remainder of the trail is primarily for experienced hikers.

The Kalalau Trail system also includes spur trails in the three valleys where trail access is feasible. A 1-1/4 mile loop trail goes into Hanakapiai Valley and an additional

1-1/4 mile Hanakapiai falls trail extends from the loop trail to the base of the falls. In Hanakoa Valley a 1/3 mile spur trail goes mauka from the campsite to the plunge pool below Hanakoa Falls. It is also possible to get to the boulder beach from the Hanakoa campsite. A trail also extends into Kalalau Valley ending at a stream pool about two miles inland. No additional trails are being considered at this time.

Recreation Resource Management

- . Block off the Hanakapiai side trail to archaeological Site HKP-19 and generally confine access to the loop trail itself.
- . The structural remains associated with Kalalau Trail's historic features should not be affected by heavy hiker traffic provided the trail is adequately maintained.
- . Native vegetation, including endangered plants, occur next to the trail, particularly along steep cliffs. Care should be taken not to widen the trail excessively and prevent erosion due to poor trail drainage systems. Herbicides should not be used without special care and should avoid sensitive localities including all that portion of the trail through the Hono O Na Pali Natural Area Reserve, streams and archaeological areas. A number of areas along the trail system contain endangered native plants. If possible a botanist should orient trail maintenance crews. Botanical surveys should definitely precede any work where the vegetation is expected to be disturbed in improving or relocating a trail.

Visitor Use Management

- . Hikers continuing beyond Hanakapiai must have a camping or day use permit.
- . No camping will be allowed along the trail and picnicking will also be discouraged.
- . Visitor use will be restricted to the existing main trail and side trails in Hanakapiai, Hanakoa and Kalalau Valleys.
- . Provide an information handout concerning trails which includes hazards, trail conditions, and a description of the trail itself and the general attractions to be seen from the trail. Also provide trail directional signs at critical trail junctions. A hazard warning sign will be developed at the Kalalau trail head warning visitors of storms or other unusual hazardous conditions.
- . Determine visitor use of spur trails.

- . No hunting will be allowed along the main Kalalau Trail except bow and arrow hunting will be allowed between Hanakoa and Kalalau.

Park Service Management

- . Identify and arrange to rebuild any trail sections which are hazardous and/or are plagued with serious maintenance problems.

- . Provide the following staff:

	Planned	Existing
Haena to Hanakapiai		
Frequency per year	3	1
Man days per event	10	5
Hanakapiai Valley Spur Trails		
Frequency per year	2	1
Man days per event	5	4
Hanakapiai to Hanakoa		
Frequency per year	3	(done by Forestry)
Man days per event	20	
Overnight stays (4 night/event)	12	
Helicopter trips	3	
Hanakoa Valley Spur Trail		
Frequency per year	3	(done by Forestry)
Man days per event	6	
Overnight stay (1 night/event)	3	
Helicopter trips (rt)	3	
Hanakoa to Kalalau		
Frequency per year	3	1
Man days per event	20	3
Overnight stays (4 night/event)	12	4
Helicopter trips (rt)	3	1
Kalalau Valley Spur Trail		
Frequency per year	3	1
Man days per event	6	6
Overnight stays (1 night/event)	6	2
Helicopter trips (rt)	4	2

	Planned	Existing
Total Overnight Stays		
Hanakapiai to Hanakoa	48	0
Hanakoa Spur Trail	9	0
Hanakoa to Kalalau	48	0
Kalalau Valley	<u>9</u>	<u>3</u>
Total	114	3
Total Helicopter Trips (rt)	13	2
Total Man Days Per Year	196	18

B. Hanakapiai

This long, narrow valley is reached via the Kalalau trail by a fairly easy, scenic one hour, two-mile hike. There is a good sized stream, a summer sand beach, a beach cave and fair swimming in calm weather. The valley loop trail is an easy trail along the valley floor that leads across Hawaiian taro terraces, through lush vegetation and by the site of a small abandoned coffee mill. The falls trail, extending from the upper portion of the loop trail, ends at a plunge pool at the base of the falls. Camping, picnicking, hiking, swimming, exploring and fishing are the major recreation opportunities. Existing public facilities include a small shelter and two pit comfort stations in the valley just behind the beach. There is a trail crew shelter and tool shed near the beach. The area was developed and maintained by the Forestry Division until 1979. In November 1977, a camping permit system was established in order to increase user turnover, curb extended stays by campers and prevent overuse of the area. Normally, there is a large number of day users at the beach, while only light use is made of the valley floor. Camping permit records established in 1979 indicate there was an average of 24.5 campers per day during peak use in August and an average of 10 or more campers per day in the off season. No day use data has been collected but day use has been estimated at 40 visitors per day in the summer and 20 visitors per day in the winter. In view of the heavy use and the opportunities for developing inland areas additional camping and/or picnicking areas could be developed within the valley in the future.

Recreation Resource Management

The following archaeological recommendations have been made for the intensively used beach area:

- . Salvage is recommended for Sites HKP-3 and HKP-4 which are in the campground area and are in a poor state of preservation.
- . Instrument mapping and subsurface testing are recommended for the beach area which involves sites HKP-1, 2 and 5.
- . Testing should be carried out around existing pit toilets and rubbish pits to determine archaeological values. Any relocation should be on the sterile areas or areas which have been salvaged.

Visitor Use Management

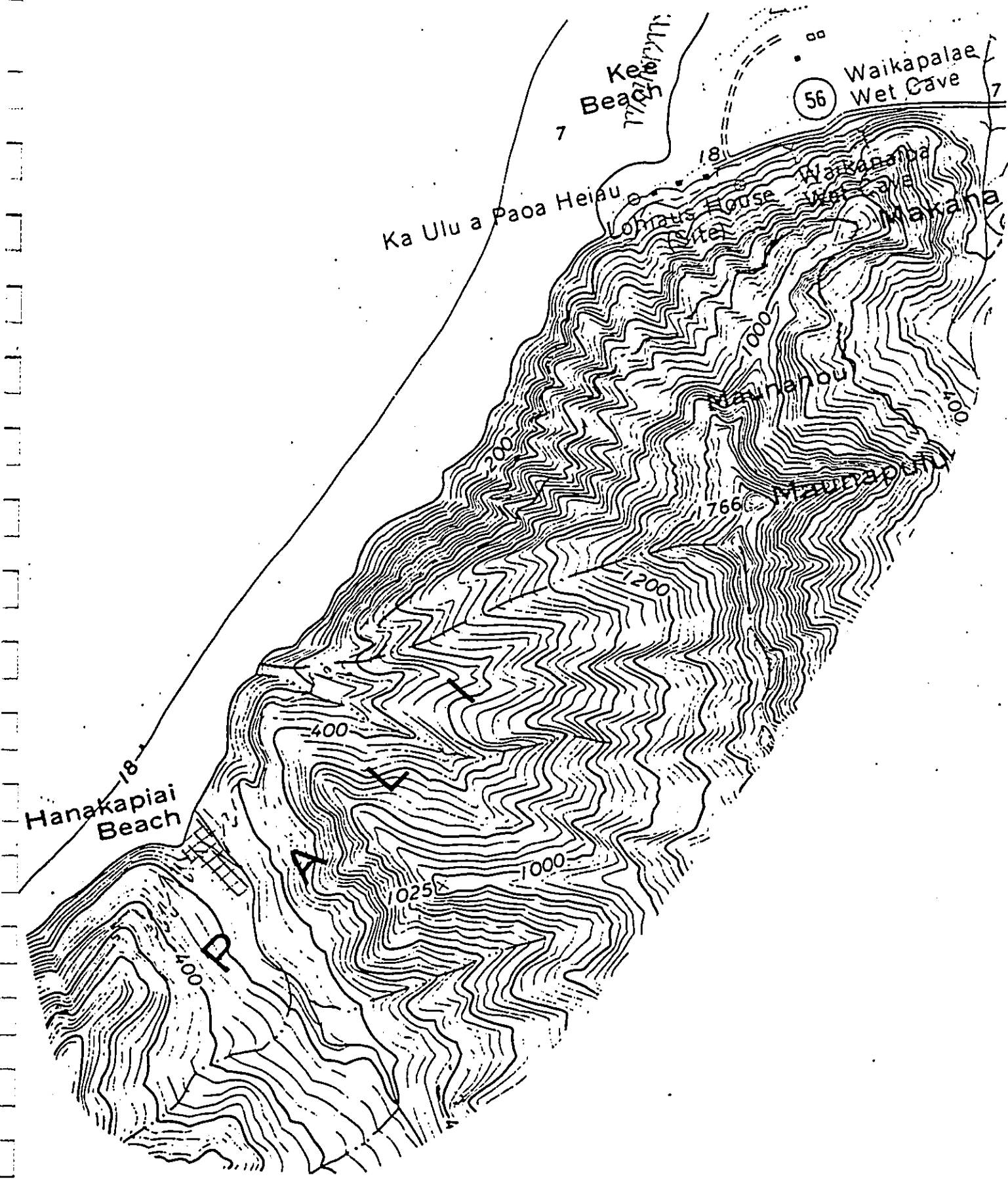
- . Day use will be allowed without a permit. A periodic day use count will be established.
- . Camping by permit will be allowed only in the campground mauka of Kalalau trail.
- . A maximum of 30 campers per day will be established. Campers will not be allowed to stay two consecutive nights.
- . Public access will be by trail only. Boat and helicopter landings will be provided for emergency and maintenance purposes only.
- . Provide hazard warning signs, printed material, and swimmer rescue equipment. Hazards include flash floods in stream, high surf and tsunamis, and lack of potable water.

Park Service Management

	Planned	Existing
. DOCARE Enforcement		
Days per week		
Winter (39 weeks)	1	1
Summer (13 weeks)	2	2
Men per day	2	2
. State Parks Maintenance/Administration		
Days per week		
Winter (39 weeks)	2	1
Summer (13 weeks)	3	2
Men per day		
Winter (39 weeks)	2	2
Summer (13 weeks)	5	3
Total DOCARE Man Days Per Year	130	130
Total State Parks Man Days Per Year	351	156

HANAKAPIAI UNIT

Intensive Use Area



C. Hanakoa

This small valley offers a wooded campsite along the Kalalau Trail midway between Hanakapiai and Kalalau valleys. The coastal section of the valley consists of a small, cobble beach located approximately 440 feet below the Kalalau Trail and one-half a linear mile from this trail. Helicopter access is available for emergency/maintenance purposes only. Recreation activities are generally limited to camping or a rest stop and some exploring, including an undeveloped trail to the beach and a trail to Hanakoa Falls and plunge pool. The limited recreation opportunities plus the dampness and mosquito problems, typically limit desired camping use to one night only. Facilities include a roof and table camp unit and a trail crew shelter. Camping permit data for Hanakoa indicates an average of 17 campers per day used the campgrounds during peak use periods in August but use was under 10 people per day most of the rest of the year.

Recreation Resource Management

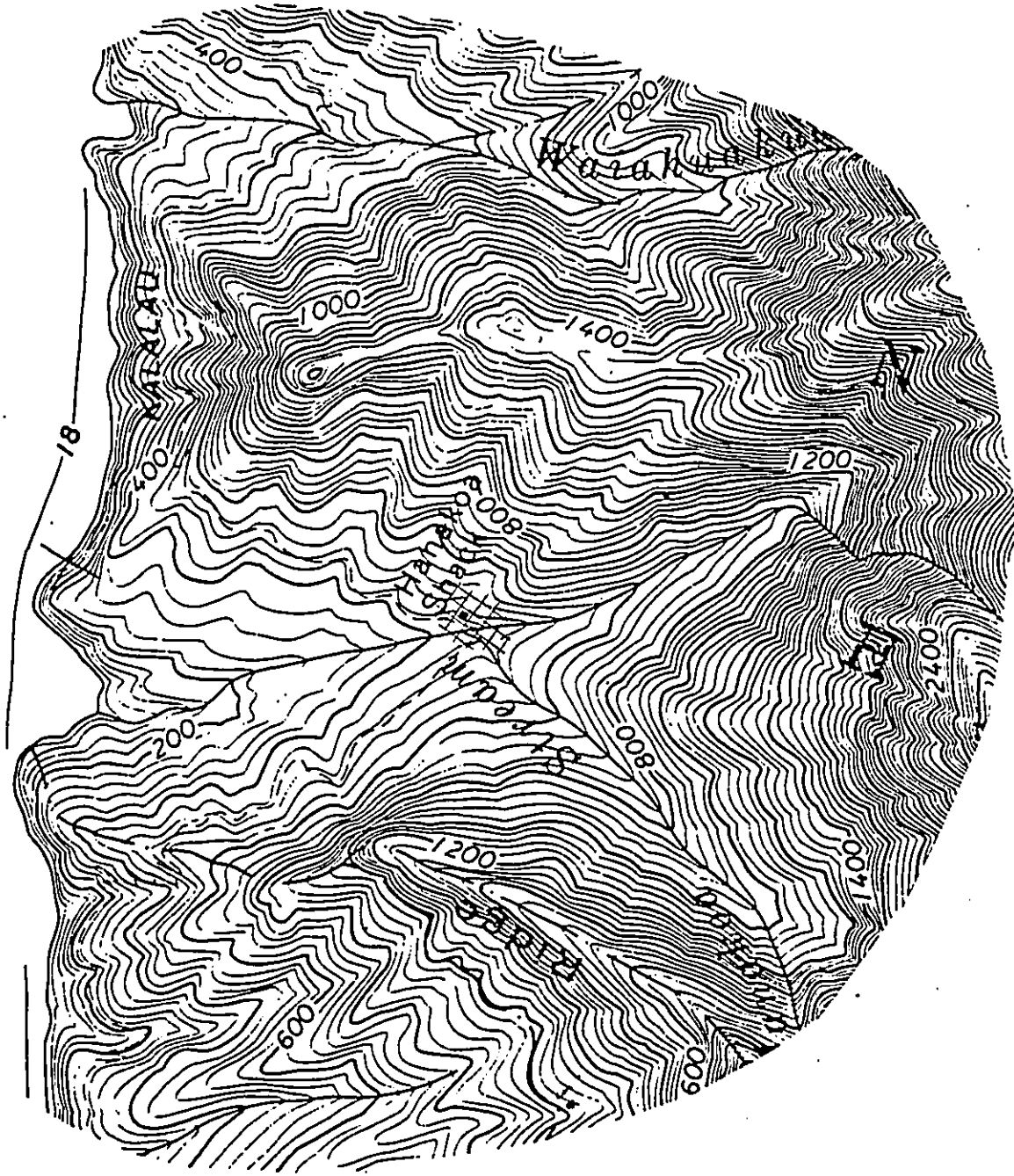
- . Archaeological instrument mapping is recommended for sites HNK 5 and 6 in the main campground area.
- . Prohibit dumping or washing in stream.

Visitor Use Management

- . Camping and day use will be allowed by permit only.
- . A maximum of 20 campers per day will be established. Campers will not be allowed to stay two consecutive nights.
- . Public access will be by trail only. The existing helipad will be maintained for emergency and maintenance use.
- . Provide hazard warning signs and printed materials. Hazards include flash flooding of stream and lack of potable water.
- . Hunter safety zones will be established, if necessary, for a bow and arrow hunting area to be established between Hanakoa and Kalalau.
- . Provide a pit comfort station.

HANAKOA UNIT

Intensive Use Area



Park Service Management

	Planned	Existing
. DOCARE Enforcement		
Days per year	4	2
Men per day	1	1
. State Parks Maintenance/Administration		
Days per month	4	1
Men per day	4	2
Total DOCARE Man Days Per Year	4	2
Total State Parks Man Days Per Year	192	24

D. Kalalau

This large, steep-sided valley is highly scenic with ample space on the valley floor for recreation use. Extensive archaeological remains are present. The valley floor has been grazed by cattle and goats and consists of exotic vegetation, with some undisturbed native species on the slopes and ridges. The coastal area includes a large beach with a narrow adjoining coastal plain and some sheltering beach caves. In addition to the trail access, boats can land on the beach and a licensed heliport has been established. A trail also extends inland, ending at a swimming pool in the stream. During calm summer weather, ocean swimming is possible for experienced swimmers. Camping, exploring, hunting and fishing are other recreation opportunities. Since Kalalau Valley is considerably larger than any of the other valleys, it is particularly important for activities such as hunting which require extensive areas. Public facilities are limited to 4 pit comfort stations and two rubbish pits. A maintenance staff storage shed has also been established here. Approximately 20 acres are managed as a public camping area. Kalalau Valley has experienced a rapid growth in visitation in recent years until the summer of 1979 when the number of visitors per day was limited to 120. This limit was reached during the peak summer use period but during the winter months permit records indicate the average number of visitors

KALALAU UNIT

Intensive Use Area



per day is 25 to 30 people. Potential for greater use of the inland areas of Kalalau Valley exists but may or may not be desirable depending on acceptable levels of use, archaeological values and public interest.

Recreation Resource Management

The following archaeological recommendations have been made for the intensively used areas:

- . Preservation of Site 3200-165 in Kalalau Valley is recommended by relocating the main Kalalau Trail mauka to bypass this site.
- . One site, KAL-3, is recommended for salvage. The site is located in the heavily used beach camping area and is now in poor condition.
- . Instrument mapping and subsurface testing are recommended for the portion of the Kalalau Beach campground designated Site 3200-167. The same type of archaeological work is recommended for the existing pit toilets and rubbish pits. Archaeological sterile areas should be located for future toilet pit and rubbish pit sites or salvage work should be undertaken.
- . Instrument mapping only is recommended for Sites KAL-1, 5 and 12.
- . Prohibit camping in the heiau area.
- . Campsites and clearing of vegetation in the campground should avoid native plants associated with this beach environment.
- . Control erosion and overgrazing by goats with a public hunting program.

Visitor Use Management

- . All visitors must have valid camping or day use permits except hunters with valid hunting permits do not require day use permits.
- . A maximum of 80 campers per day will be established. The maximum length of stay will be 5 nights.

- . Public access by hiking only will be encouraged. Private boat access is also provided at the designated landing site.
- . Commercial tour boat access will be allowed from May through September for campers with valid camping permits. Landings at the designated landing site will be limited to periods between 7-9 a.m. and 4-6 p.m.
- . Commercial helicopter access will be allowed for campers with valid camping permits. All normal commercial landings will be at the designated licensed heliport and shall not exceed 15 minutes. All these landings will be limited to periods between 8 a.m. and 9 a.m. and again between 4 p.m. and 5 p.m.
- . Drop offs will be limited to 15% of the maximum number of campers allowed for both commercial tour boats and helicopters. An equitable arrangement for sharing modes will be arranged.
- . Provide hazard warning signs, printed material and swimmer rescue equipment. Hazards include flash floods in streams, high surf and tsunamis, and lack of potable water.
- . Provide a public hunting program on Saturdays and Sundays during the months of August and September. Establish hunter safety zones and provide special signage for the zones during hunting seasons. Warn campers of the hunting activities and prohibit nonhunter access in Kalalau Valley during hunting periods.

Park Service Management

	Planned	Existing
. DOCARE Enforcement		
Days per month		
Winter (9 months)	8	4
Summer (3 months)	12	8
Men per day	1	1
. State Parks		
Days per month		
Winter (9 months)	8	8
Summer (3 months)	30	20

	Planned	Existing
Men per day		
Winter (9 months)	2	2
Summer (3 months)	4	3
. Support Services		
Overnight stays	104	90
Helicopter trips (rt)	30	30
Total DOCARE Man Days Per Year	108	60
Total State Parks Man Days Per Year	504	324

E. Honopu

This highly scenic beach area includes two small sand beaches separated by a ridge which is penetrated by a rock arch about 70 feet high under which Honopu Stream flows after dropping in a waterfall from the main valley floor above. Since storm waves can reach the sheer pali walls there is virtually no developable land at Honopu Beach. At the present time, access is mainly by swimmers who face some risk of currents and sharks coming in around from Kalalau Beach in calm summer seas. Access to the main valley from the beach is possibly by two different, hazardous steep trails but should be discouraged. No user data is available and since there is no developable land, there are no facilities. Recreation opportunities are limited to swimming and enjoying the spectacular scenery.

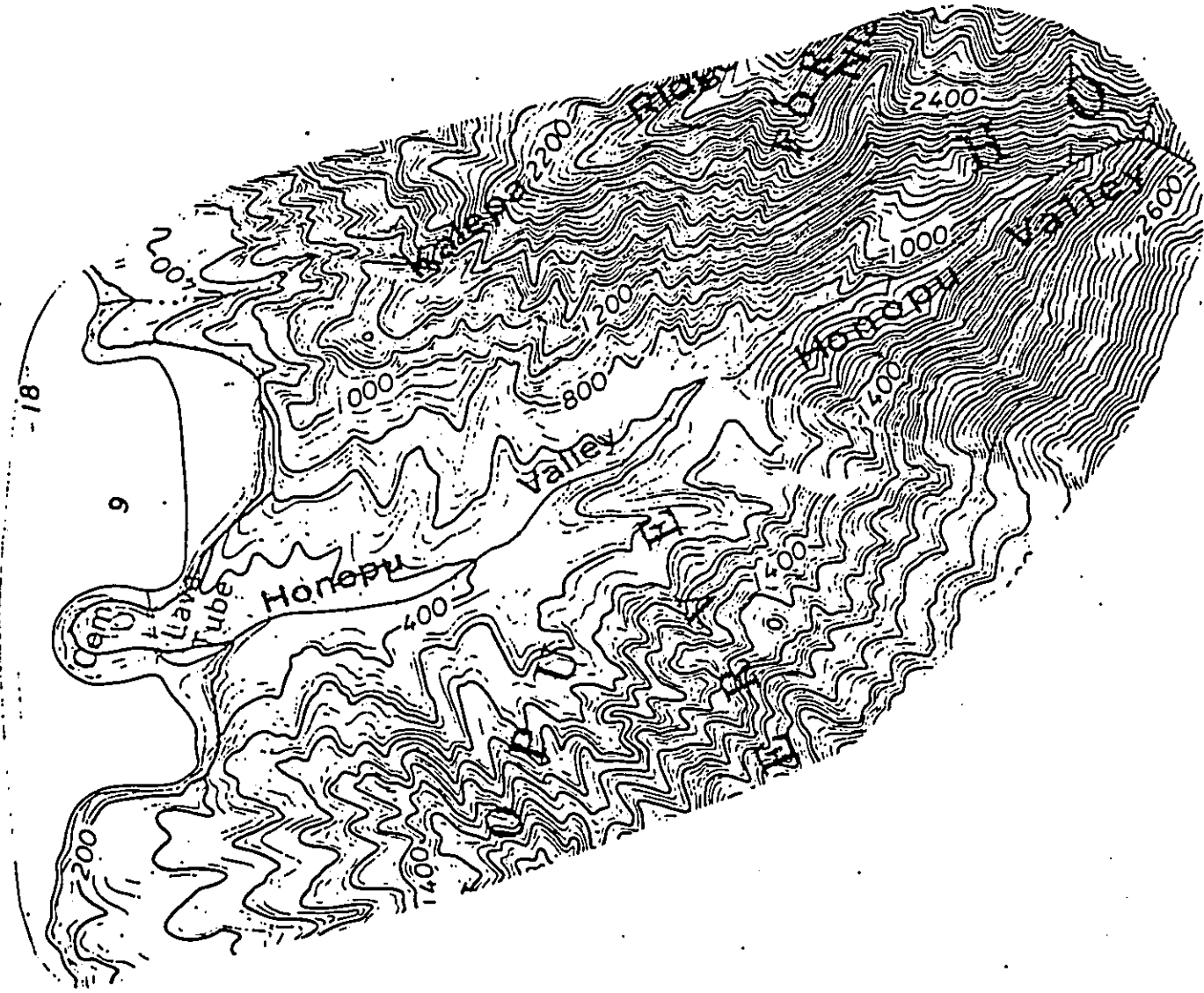
Recreation Resource Management

- . Since there are no archaeological features on the beach the only resource management concern is the protection of native plants. This is the only existing visitor destination area on the Na Pali Coast where the protection of native plants, including some rare species, is a concern. Periodic weed control of all exotic plants is recommended to the extent it is practical.

Visitor Use Management

- . Day use only will be allowed at Honopu Beach. No facilities will be developed.
- . No use of Honopu Valley shall be allowed except by special permit or by hunters with valid hunting permits.
- . The existing public hunting program will be continued in Honopu Valley on summer weekends during August and September. No hunting will be allowed on Honopu Beach.

HONOPU UNIT



- . No commercial helicopter or boat landings will be allowed except for emergency or management purposes.
- . Provide printed material warning of hazards but do not provide warning signs. Hazards include high surf, tsunami, lack of potable water, ocean currents, sharks and hazard of climbing cliffs.

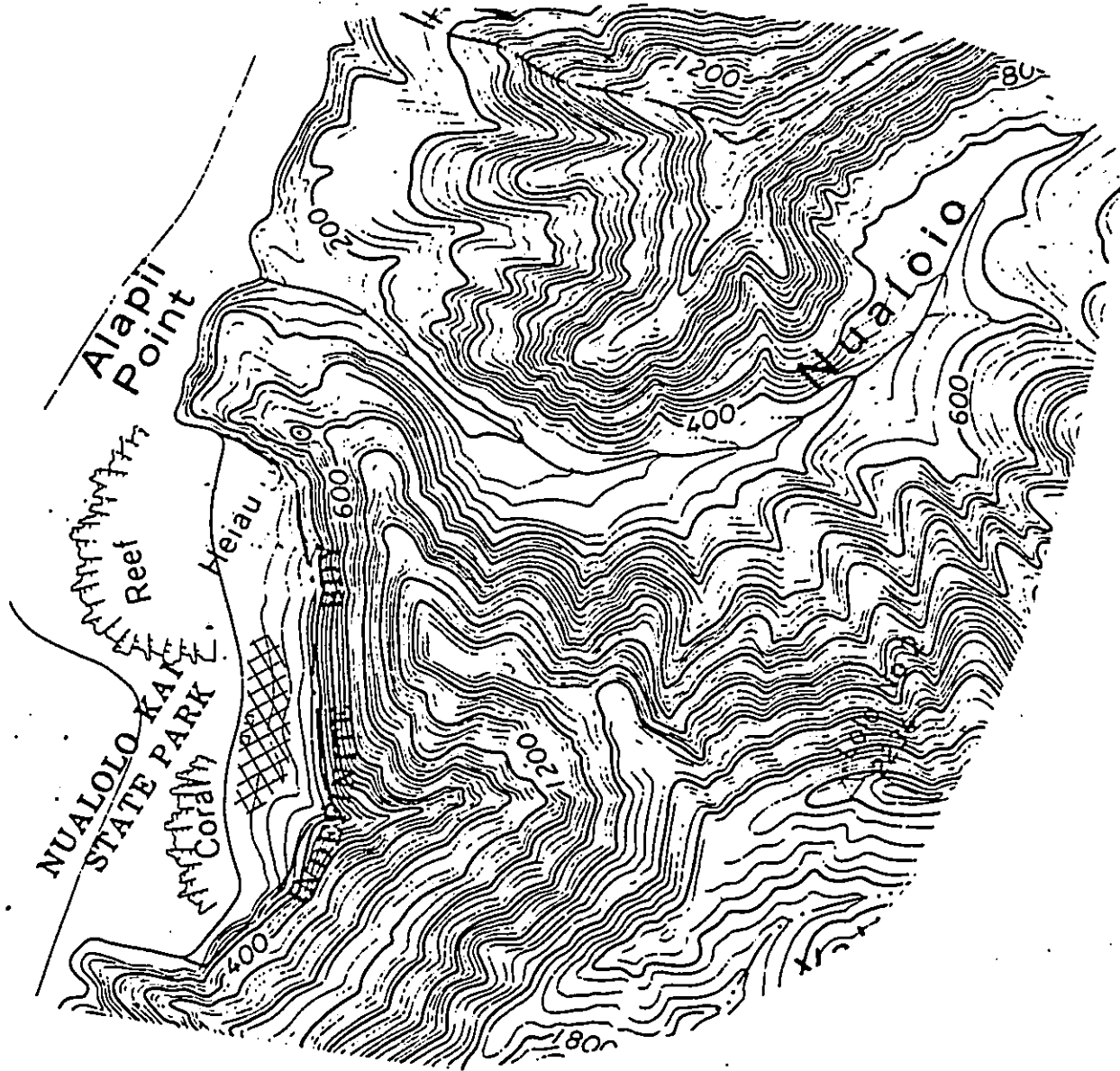
	Planned	Existing as needed
. DOCARE Enforcement		
. State Parks Maintenance/Administration		
Days per season		
Winter (9 months)	5	5
Summer (3 months)	40	20
Men per day		
Winter (9 months)	0.5	0.5
Summer (3 months)	0.5	0.5
. Support Services		
Helicopter trips (rt)	18	10
Total State Park Man Days Per year	23	13

F. Nualolo

The coastal flat of Nualolo Kai is situated at the base of a sheer cliff backdrop extending 1,200 feet above the beach area. The coastal flat is over 3,000 feet long and approximately 250 feet wide and is characterized by high talus bluffs. Nualolo Aina, the hanging valley portion of Nualolo, contains developable land of high archaeological value but is essentially inaccessible by trail from Nualolo Kai although a steep trail and ladder connection apparently existed when Hawaiians occupied the area. An unprotected boulder beach at the foot of Nualolo Aina valley now provides the only land access to both Nualolo Aina and Awaawapuhi, an adjoining hanging valley of archaeological interest.

A boulder and sand beach has formed along the shoreline of Nualolo Kai. An extensive fringing reef, the largest along the Na Pali Coast, extends almost 300 feet off shore and during normal summer conditions, provides safe boat anchorage through a break near the middle of the reef flat. Boat landings are authorized but there is no licensed heliport. Swimming opportunities are

NUALOLO UNIT
Intensive Use Area



limited for novices but the cove area provides excellent snorkeling and fishing opportunities. The area also offers opportunities for reef study and camping. There is one shelter and 2 pit toilets but there is no perennial source of fresh water. Approximately 15 acres are managed for public use. According to permit data, visitor use of this beach has been quite low averaging less than 10 people per day even in the peak summer use periods.

Recreation Resource Management

The following archaeological recommendations have been made for the intensively used areas.

- . Instrument mapping and subsurface testing are recommended around the pit toilets and rubbish pits. Testing should include the identification of new sterile sites for the future relocation of these facilities.
- . Instrument mapping and subsurface testing are also recommended at archaeological sites NUK-1 and 2 and 3200-197, 198 and 199.
- . A single banyan tree near the beach should be destroyed since it is a source of seed for an undesirable exotic species.
- . Campsites and clearing of vegetation in the campground should avoid native plants associated with this beach environment.

Visitor Use Management

- . All visitors must have valid day use or camping permits. The park unit will be closed from October 1 to May 1.
- . A maximum of 20 visitors per day will be allowed. No more than 50% of this maximum will be for overnight use and the maximum length of stay will be 2 nights. However, until the archaeological instrument mapping and subsurface testing is completed, no camping will be allowed.
- . Use of Nualolo or Awaawapuhi valley will not be allowed except by special permit as established in Division of State Parks Regulation 1 or by hunters with valid hunting permits.

- . No commercial helicopter access will be allowed to Nualolo Kai.
- . Private and commercial tour boat access will be allowed from May through September. All passengers must have valid day use or camping permits.
- . The existing public hunting program will be continued in Nualolo and Awaawapuhi valleys on summer weekends during August and September. No hunting will be allowed at Nualolo Kai.
- . Provide hazard warning signs and printed material. Hazards include flash floods from intermittent streams, high surf, tsunamis, lack of potable water and hazards of climbing cliffs.


Park Service Management

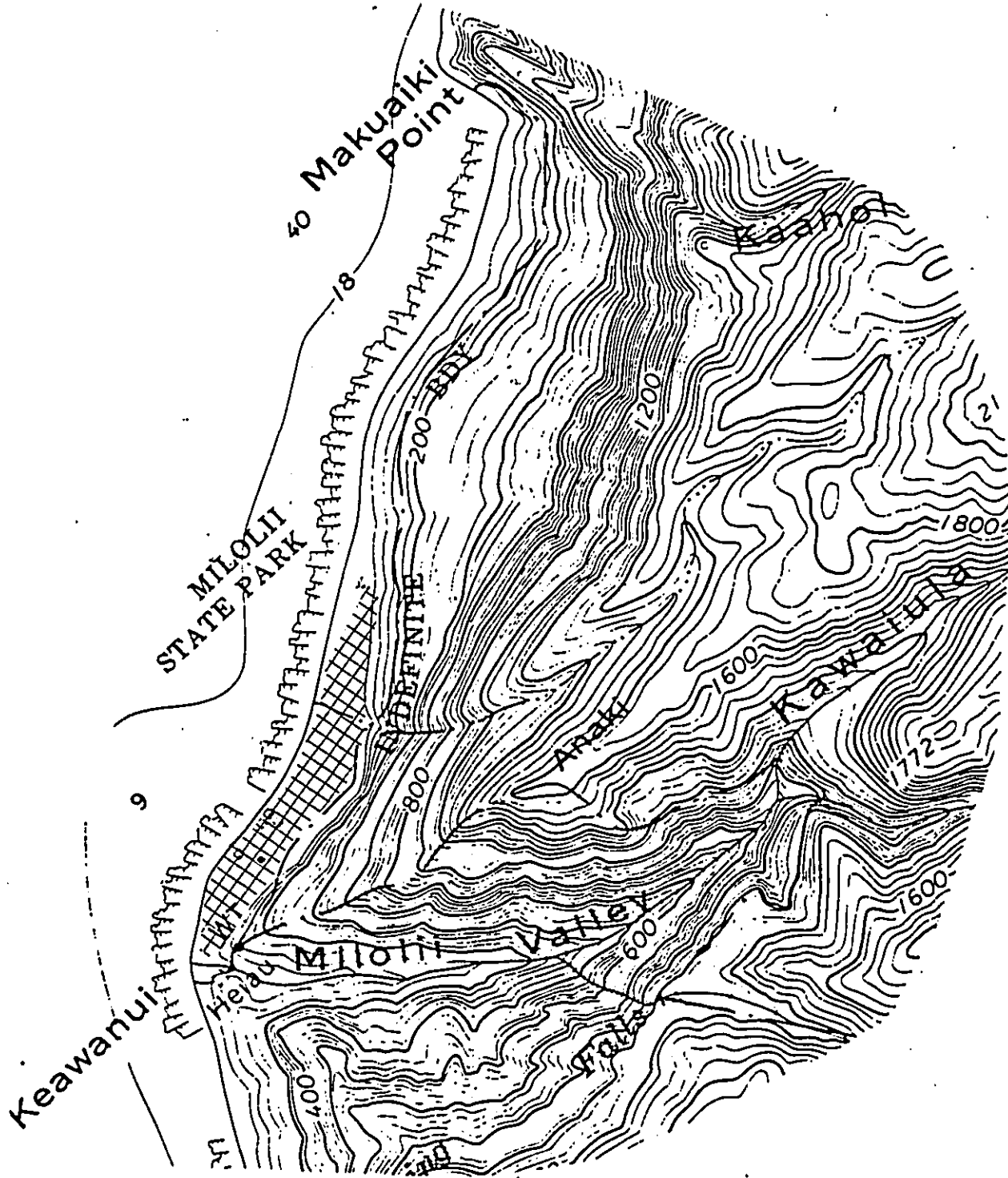
	planned	existing
. DOCARE Enforcement		
Days per month (5 months)	1	1
Men per day	1	1
. State Parks Maintenance/Administration		
Days per month (5 months)	6	4
Men per day	3	3
. Support Services	trips all by boat	
Total DOCARE Man Days Per year	5	5
Total State Parks Man Days Per Year	90	60

G. Milolii

Located on the leeward end of the proposed Na Pali Coast State Park, this relatively dry area consists of a coastal flat and a small alluvial valley. Milolii coastal flat is almost a mile long and 500 feet wide. The northeastern half is a high lantana covered bluff while the southwestern portion is a dune and sand beach. A small talus slope has developed behind the sand area at the base of the 1,650 foot pali. Milolii Valley is a small alluvial valley accessible from Milolii coastal flats but is not part of the intensively managed recreation area. A small fringing reef extends 250 feet off the length of the coastal flats.

MILOLII UNIT

 Intensive Use Area



Surrounding palis make trail access outside the area impossible but boat landings are possible through a narrow break in the reef during calm summer sea conditions and a licensed heliport has been established. Swimming is limited to reef pools and in comparison to Nualolo Kai, Milolii offers fewer opportunities for snorkeling and near shore fishing. The shallow reef flats are relatively barren of fish life and inshore waters are likely to be turbid. Other recreation opportunities include camping and access to hunting. This park unit has more facilities than any other unit in the park. Approximately 40 intensively managed acres of the beach area contain 3 pit toilets, 3 rubbish pits, 3 shelters and a cabin. Piped water and a shower are available but the water is not potable. Visitor use of this beach has fluctuated because the park is sometimes used by large groups but the average use even in peak summer periods was less than 10 people per day in 1979. This is the one unit within the park where usage is expected to increase because year round helicopter access will be provided.

Recreation Resource Management

The following archaeological recommendations have been made for the intensively used beach area.

- . Instrument mapping and subsurface testing are recommended around the pit toilets and rubbish pits. Testing should include the identification of new sterile sites for the future relocation of these facilities.
- . Instrument mapping and subsurface testing are recommended at archaeological sites 3200-201G and J located near the mouth of Milolii Valley if the helicopter landing site is to be relocated to this area. Otherwise only instrument mapping is recommended.
- . Instrument mapping only is recommended at archaeological Sites 3200-201D near the park cabin.
- . Any control of vegetation in the intensively used areas should avoid the destruction of native plants. Fire control is also a somewhat special problem to avoid the destruction of an endangered native plant growing near the sea cliffs.

- .. A nesting population of Newell's shearwaters, a threatened species, was located in the cliff face behind the cabin in 1979. If this atypical site continues to be used, disturbance of the birds should be minimized. The primary disturbance is probably helicopter landings, but the landing site is to be moved further from this area.

Visitor Use Management

- . All visitors must have day use or camping permits.
- . A maximum of 30 visitors per day will be allowed. The maximum length of stay will be 3 days.
- . The park cabin may be rented to the public at a fee to be established. Department staff may also reserve the cabin at no fee while on official business.
- . Private boat access will be allowed.
- . Commercial access will be limited to helicopters. All normal commercial landings will be at a designated, licensed heliport and shall not exceed 15 minutes. All drop offs for camping or day use will be limited to periods between 8 a.m. to 9 a.m. and again between 4 p.m. and 5 p.m. From October to May, drop offs will be limited to 70% of the maximum number of visitors allowed and from May to October, drop offs will be limited to 30% of the maximum number of visitors allowed. If a group with a single camping permit is larger than this limitation and is using helicopter access, the limit will be waived. Reststops will also be allowed from 9 a.m. to 4 p.m. and landings shall not exceed 15 minutes.
- . The existing public hunting program will be continued in Milolii Valley on summer weekends during August and September. No hunting will be allowed on the Milolii coastal flats. Hunter safety zones will be established during the hunting season and nonhunter access in Milolii Valley will be discouraged.
- . Provide hazard warning signs and printed material. Hazards include flash floods, high surf, tsunamis and lack of potable water.

<u>Park Service Management</u>	Planned	Existing
. DOCARE Enforcement		
Days per month	2	0
Winter (9 months)	10	1
Summer (3 months)		
Men per day		
Winter (9 months)	1	1
Summer (3 months)	1	1
. State Parks Maintenance/Administration		
Days per month	1	0.5
Winter (9 months)	15	10
Summer (3 months)		
Men per day		
Winter (9 months)	4	4
Summer (3 months)	5	5
. Support Services	180	120
Overnight stays	22	17
Helicopter trips (rt)		
Total DOCARE Man Days Per year	48	3
Total State Parks Man Days Per Year	261	168

Section II

The Environmental Assessment

I. Relationship of the Proposed Action to the Land Use Plans, Policies and Control for the Affected Area

A. Historical Land Use

The Na Pali coastal area encompasses all of the traditional district of Na Pali and part of the district of Kona. Na Pali, the smallest of the five districts on Kaua'i, consists of five ahupua'a: Hanakapi'ai, including Hanakapi'ai and Ho'olulu Valleys; Hanakoa, including Hanakoa and Waiahuakua Valleys; Kalalau Valley; Honopu, including Kalalau Beach and Honopu and Awa'awapuhi Valleys; and Pohakuao, which consists of the small drainages along the coast between Hanakoa and Kalalau. Nu'alolo and Miloli'i are the northernmost valleys of the ahupua'a of Waimea in the district of Kona.

The archaeological landscape of Na Pali indicates an intensive development and occupation of almost all available land along the rugged coastline. But the present landscape represents the end product of a long history of settlement; little is known of its origin or its evolution from its natural to its present culturally modified form.

Two archaeological excavations, one at Ha'ena and the other at Nu'alolo Kai, have yielded chronometric dates which suggest a baseline for a coastal chronology. At Ha'ena, settlement can be traced as early as the beginning of the 11th century. Excavation in the sand dune at Ke'e Beach produced a volcanic-glass hydration-rind date of A.D. 989 \pm 42 (volcanic glass years) from a deposit interpreted as a permanent, primarily marine resource-oriented occupation (Hammatt et al 1978: 147). This is the earliest dated human settlement on the island of Kaua'i. The excavation at Nu'alolo Kai is presently unreported except for a carbon-14 date of A.D. 1389 (570 \pm 200 yrs B.P.) from the lowest occupation level in a habitation terrace (Emory et al 1968: viii).

For several hundred years after these occupation dates, settlement along this coast developed. But early European explorers were unable to appreciate that

development. When the mission stations were established on Kaua'i, Na Pali fell within the province of the mission at Wai'oli, which was organized in 1835; Nu'alolo and Miloli'i were part of the original Waimea mission. In 1937, William Alexander and Sister E. Johnson were the first missionaries to stop at Kalalau (Alexander 1934: 218). It is uncertain about the early extent of Christian contact but by 1852, a small school had been started and nine valley residents were Church members (Johnson 1852). Within seven years, half the population of Kalalau, which numbered approximately 70, belonged to the Church (Johnson 1859) but Mormonism was introduced soon after and Edward Johnson, the Wai'oli missionary, reported that ten of his Church members had turned to "Error" (Johnson 1863).

Na Pali was considered an out-post of the Wai'oli Mission and visits were limited by sea conditions to once a year during the summer months. Johnson's estimates of population are recorded for Kalalau but probably include the neighboring valleys as well.

In 1848, changes in the Hawaiian system of land tenure were formalized in the Mahele, the division of land between the Hawaiian king and his chiefs. All of the Na Pali district was claimed by Kamehameha III and subsequently turned over to the Legislature to be administered as Government lands. Nu'alolo and Miloli'i were claimed as Crown lands as part of the ahupua'a of Waimea. Several small parcels in Miloli'i were awarded to individuals as Land Commission awards. Government lands in Kalalau, Pohakuao, and Honopu were sold to individuals. The rest of the coastal lands remained undivided.

Little is known of the history of the Na Pali in the second half of the 19th century. In Kalalau, land continued to be lived on and cultivated. Taro (and possibly olona) was being grown for trade (Nakulala 1864) but subsistence apparently continued as the primary agricultural pursuit. Commercial coffee cultivation was taking place in Hanakapi'ai and Hanakoa; ti may have been grown for okolehao. Johnson mentions two men from Honolulu who moved into an uninhabited valley near Kalalau for the purpose of distilling alcohol (Wai'oli Station Report 1860). A 1903 map (HTS 1903) shows wet lands (presumably irrigation fields for taro) at the mouth of Hanakapi'ai Valley.

The Na Pali valleys are presently described as rugged and inaccessible, but a historic, and probably aboriginal,

trail system connected many of the valleys and tied the central coastal area to Koke'e and Polihale. Bennett (1931: 7) notes trails between Kalalau and Honopu, Miloli'i and Koke'e, Miloli'i and Nu'alolo Kai, Nu'alolo 'Aina and Nu'alolo Kai (Site 3200-195), and the Kamaile trail from Koke'e into Nu'alolo 'Aina. Thurston (1922) reported two members of his party hiking from Honopu to Nu'alolo 'Aina along a cliff trail. The 1903 Hawaii Territorial Survey map shows the location of a Kalalau to Koke'e trail. A listing of place names (Gay ms) identifies several "roads" in the Na Pali area, among them, Hapu'unui, a ridge and road up to Kahue Valley (upland gulch area above Hanakoa Valley) and Kaloa, a road from Kilohana (a point of Kaunuohua Ridge) into Kalalau. The Ha'ena to Kalalau trail was originally built in the late 19th century (Handy and Handy 1972: 417), and stabilized in the 1930's by a government work crew.

The chronology for abandonment of this coastline is uncertain. Kalalau, and possibly Nu'alolo Kai, were the final areas to be abandoned; the last 'ohana left Kalalau Valley in 1919.

Cattle grazing took place after 1920 (Henke 1929) in the area from Hanakapi'ai to Kalalau, but proved unfeasible by the mid-20th century. Cattle were either shipped out by barge or led single file out along the cliff trail. Remnants of the Makaweli Ranch operation are still visible in Pohakuao and Kalalau. Two head of cattle still roam in Kalalau Valley.

In 1907, the mauka part of the coastal area became the Na Pali-Kona Forest Reserve. In 1938, Miloli'i was incorporated into the Pu'u Ka Pele Forest Reserve, and Hanakapi'ai and Hanakoa Valleys were placed in the Na Pali-Kona system. The valleys of Honopu, Awa'awapuhi, and Nu'alolo, and the coastal areas of Nu'alolo and Miloli'i were added to the latter forest reserve in 1946.

Nualolo Kai and Milolii flat were developed by State Parks in 1962. Inholdings in Kalalau Valley were acquired by the State of Hawaii and the valley floor was assigned to the State Parks Division by executive order in 1974.

B. Existing Land Ownership and Management Responsibilities

The Na Pali Coast is state owned and, with the exception of the 1280 acre area in Kalalau Valley assigned to state parks, the entire area is within the State Forest Reserve system. The Hono O Na Pali Natural Area Reserve is in the process of being taken out of the

forest reserve but will continue to be managed by the Division of Forestry except for the Kalalau Trail and coastal section which is expected to be managed by the State Parks Division. The cooperative management agreements among the divisions as established in Section 1, II C1 of this plan are already in effect as part of an interim management plan for the Na Pali Coast.

The rationale for the proposed park boundaries are given in Section 1, II B. Portions of two other existing state parks share common boundaries with the Na Pali Coast proposed park. Kokee State Park extends to the Kalalau Valley rim and Haena State Park, which is largely undeveloped, shares a less well defined boundary on the pali land just behind the coastal plain by Kee Beach. Coordination of park management between Kokee and the Na Pali Coast is limited to protecting the scenic vistas from Kokee since no access of any kind is feasible. Haena State Park, however, includes the Kalalau Trail hub and future plans for this area will be closely coordinated with Na Pali Coast planning. The Haena area was not included in the subject plan because it is not part of the wildland coastal area and will therefore be managed quite differently as a more intensively used beach park and historic park with road access.

C. Land Use Controls and Policies

The proposed park is entirely within the State Land Use Conservation District zone. There are no existing encumbrances on the land except for executive orders establishing forest reserve areas and assigning Kalalau Valley to the State Parks Division. The proposed park is also part of a designated public hunting area. Policies adopted by the Board of Land and Natural Resources for the Na Pali Coast include the following:

- 4/19/78 Conservation District Use Application for Na Pali Zodiac approved, allowing commercial tour boats to carry passengers for pick up and drop off along the Na Pali Coast.
- 1/11/80 Conservation District Use Application for commercial use of two Na Pali heliports for camper pick ups and drop offs.
- 6/13/80 Conservation District Use Application of 1/11/80 amended to include one heliport for rest stops.
- 8/22/80 Acceptance of the Na Pali Coast Management Plan with the understanding that further, more

detailed plans will be submitted by June 30, 1982. The preceding Board actions were incorporated in the plan.

In December, 1977, a Haena-Na Pali Coast Environmental Impact Statement Notice of Preparation was submitted. However the proposed plan was dropped in favor of the subject plan and the environmental impact statement was never drafted.

There are no uses proposed for the Na Pali Coast other than those uses included in the plan. In order to establish the proposed park by executive order those areas now within the forest reserve will have to be removed from this encumbrance before being placed in a park. This action is not expected to alter the existing forest management of the area and has been endorsed by the Division of Forestry.

II. Anticipated Environmental Impacts and Mitigating Measures to Minimize Adverse Impacts

A. Primary Impacts

Recreation use of the Na Pali Coast involves two major environmental impacts; the impact of visitors on the natural and cultural resources of the area and the impact of the visitors on each other as they sometimes seek conflicting recreation experiences in this wildland environment. The basic objective of the management plan is to minimize these primary environmental impacts. Within the management plan the unit entitled Overall Park Management identifies and evaluates the extent of the known environmental impacts particularly in the portions dealing with resource management and visitor use management. Mitigating measures are also discussed in general terms in this unit of the plan but the following major unit, Recreation Management Objectives, deals more specifically with the overall mitigating measures for resource protection and visitor use. The last unit applies these mitigating measure objectives to specific park units which comprise the Na Pali Coast area.

B. Secondary Impacts

In managing the Na Pali Coast environment the secondary impacts are associated with the park services required by various government agencies, and commercial access operators in protecting the natural and cultural resources and providing a safe, satisfying experience for the visitor. These secondary impacts are also addressed

in the management plan by the Overall Park Management unit, Recreation Management Objective unit, and the final unit on managing each geographic unit within the park. Each of these units of the plan has a topic dealing with park services as part of an identified unit subsection.

III. Probable Adverse Environmental Effects Which Cannot Be Avoided

A. Boat and Helicopter Access

Boat and helicopter access provides a recreational opportunity for people who would not otherwise be able to visit the coast because of time constraints or the difficulty of hiking long distances on somewhat difficult trails. This means of access also allows people to visit places which are inaccessible by trails and to view the rich scenic beauty from different perspectives. Boat and helicopter access is essential for providing park services related to maintenance, enforcement and search and rescue missions.

The Na Pali Coast Management Plan is generally limited to controlling boat and helicopter landings. Unless they are also landing, boats and aircraft passing by the coast have not been dealt with in the plan even though they may also have an adverse visual and noise impact on the Na Pali Coast visitors' wilderness type experience. The most serious intrusion for most visitors is likely to be the noise impact from helicopter landings. The following report on the impact was presented in the 1978 Environmental Impact Statement for Helicopter Landings on the Na Pali Coast.

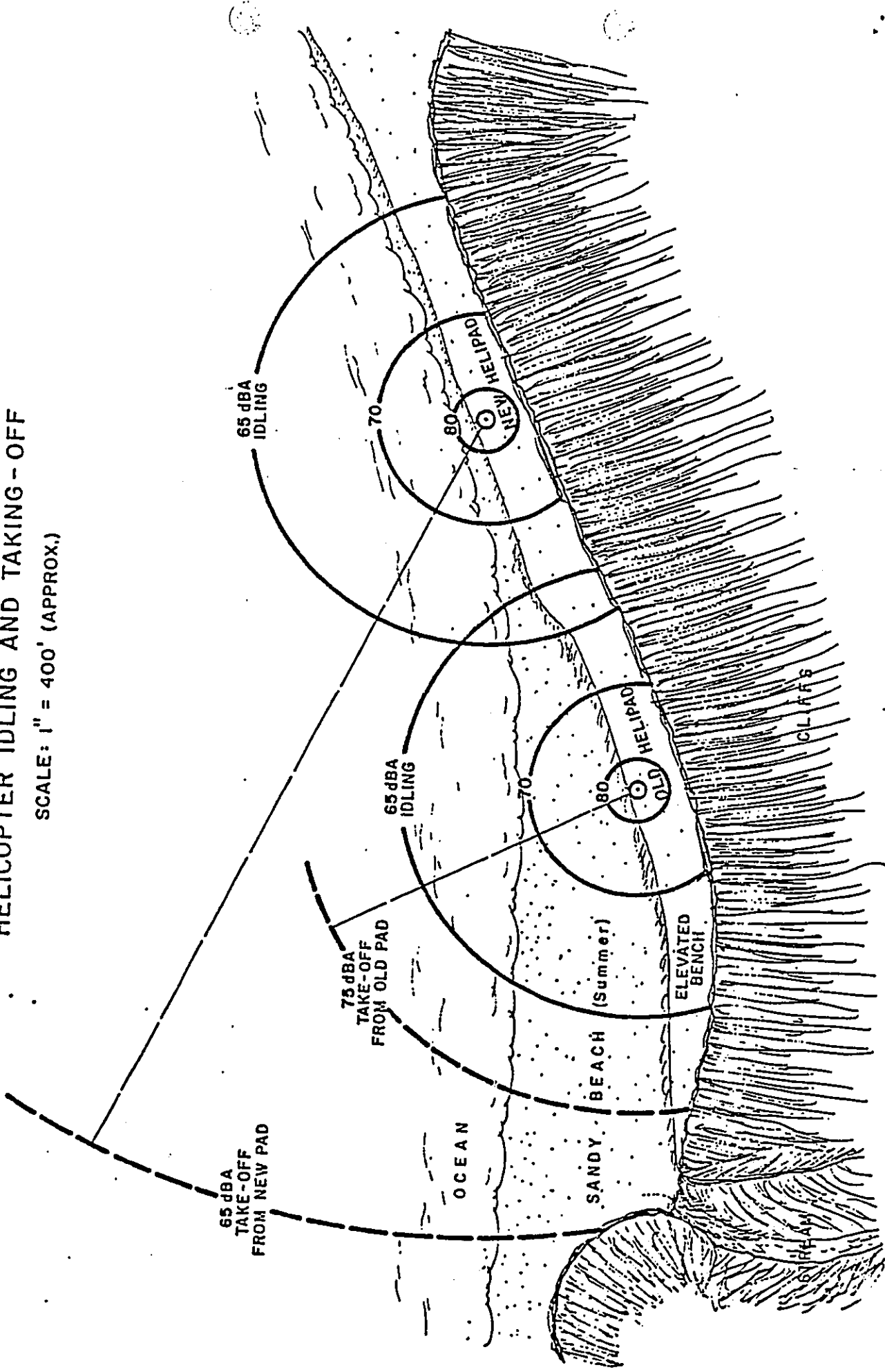
"Noise Impacts. As previously mentioned, noise is one of the primary impacts of helicopter operations. In an effort to quantify the magnitude of the noise impact, field tests were conducted by personnel of VTN Pacific to determine the noise ranges at various distances from the helicopter, with the helicopter idling on the ground, taking off and landing, hovering above the observer and passing by at various altitudes. Readings were taken with a GR 1565-B, Type 2 meter using the "A" scale, which most closely resembles the response of the human ear to noise.

Figure 10 shows a plot of the noise readings (in dBA) vs. distance from the helicopter (a Papillon 6-passenger Bell Ranger) idling on the pad at Kalalau. Background levels were in the 59-63 dBA range. With the helicopter idling on the pad, readings were as high as 93 dBA under

FIGURE 10

SKETCH OF KALALAU BEACH SHOWING
HELIPADS AND NOISE CONTOURS FROM
HELICOPTER IDLING AND TAKING-OFF

SCALE: 1" = 400' (APPROX.)



the rotor, and remained above 80 dBA for a distance 90 feet from the helicopter. Noise levels of 75dBA were recorded as far away as 150 feet and dropped to 71 dBA at 300 feet.

Readings were taken at Princeville Airport with the helicopter hovering at different altitudes above the observer. Noise levels decreased from 80 dBA with the helicopter 100 feet above the observer to 74 dBA at 500 feet above the observer.

Noise readings for several pass-by's Hanakoa Valley are graphed in Figure 11. Pass-by #1 (Figure 11a) was made with the helicopter heading mauka on the normal route to the waterfall at an altitude of 1,000 feet, 500 feet above the observer located at the Hanakoa landing pad. Readings above the background level of 48 dBA were recorded for 67 seconds; a peak value of 64 dBA was noted. Noise elevation above background as recorded at the Hanakoa landing pad lasted only 45 seconds with another helicopter pass-by at 1,000 feet altitude over the shoreline (data not shown).

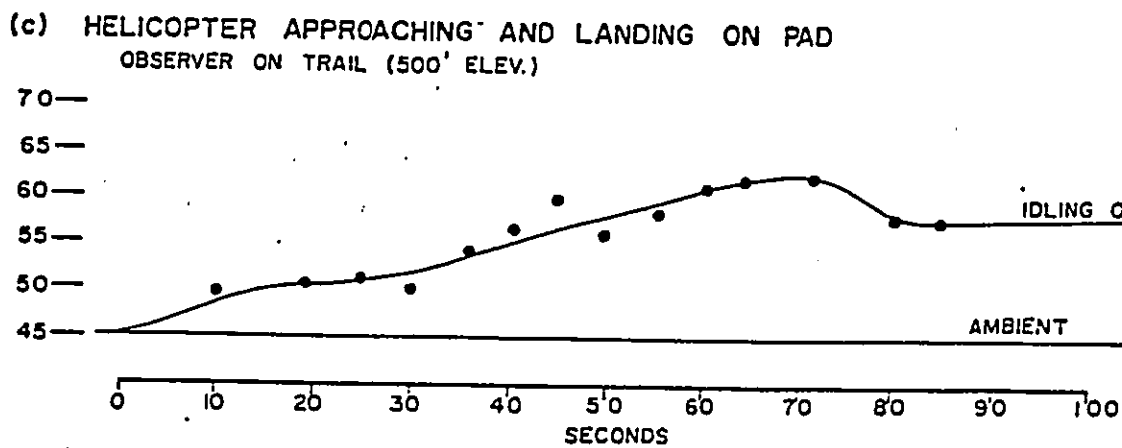
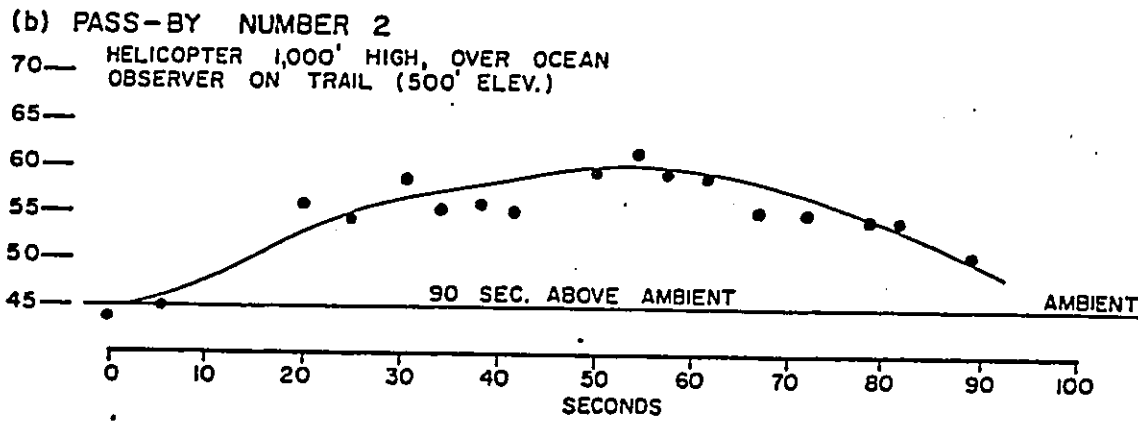
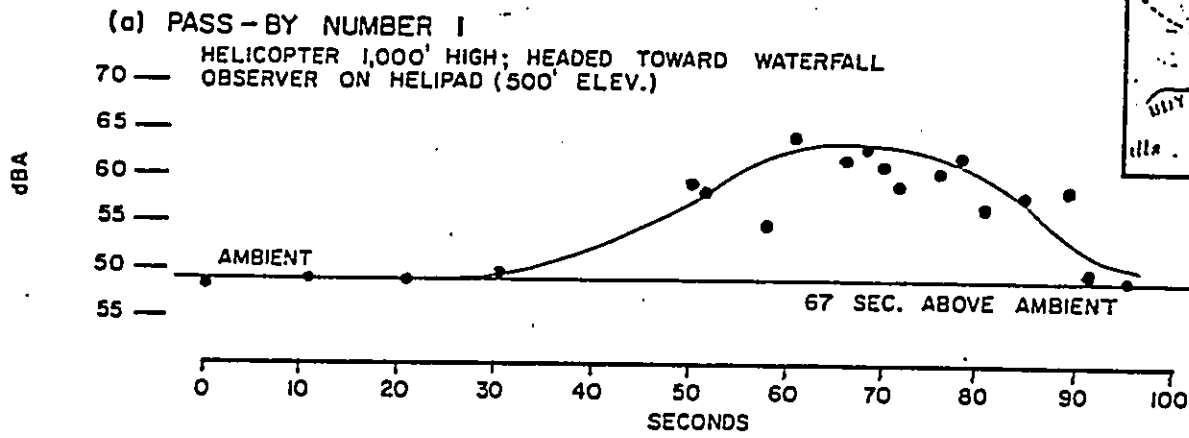
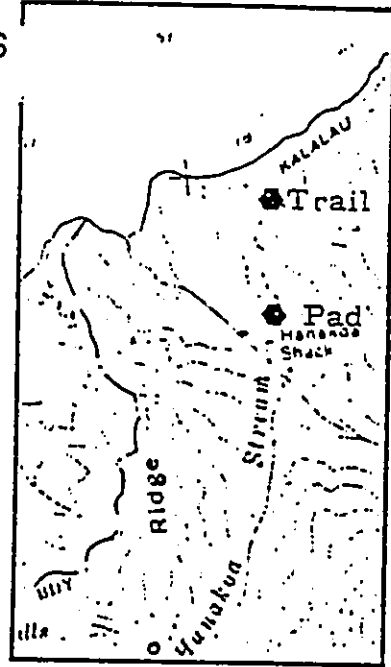
Noise data for another helicopter pass-by of Hanakoa Valley is shown in Figure 11b. This time the helicopter was flying over the ocean at 1,000 feet altitude near and parallel to the shoreline (pass-by #2) and the observer was located on the trail at 500 feet altitude, in allocation more exposed to the ocean (see Figure 11 inset). The total noise elevation above background (45 dBA) lasted 90 seconds for this pass-by. Peak noise readings of 62 dBA were recorded for this pass-by.

The graph in Figure 11c shows the noise readings as recorded by an observer on the trail, at Hanakoa Valley, approximately 1,500 feet from the helipad, as the helicopter passed overhead and landed at the pad. Peak readings were 62 dBA and stabilized at 57 dBA as the helicopter landed on the pad and kept the engine running.

From the data gathered on the field and the available statistics on helicopter operations, a few inferences can be made on the total noise impact created by helicopters operating on the Na Pali Coast.

- a) While helicopters are on the landing pads with the engine running (as is the case during the brief rest stops on the sight-seeing tours, for instance), peak noise

FIGURE II
NOISE READINGS FROM HELICOPTER PASS-BYS
AND LANDINGS AT HANAKOA VALLEY



levels adjacent to the helicopter will exceed 90 dBA. Beyond 300 feet from the helipad the noise level drops below 70 dBA (Figure 10). The noise impact will be more noticeable in valley locations than in beach areas, due to the lower ambient noise levels in the valleys (45-50 dBA vs. 60 dBA, Figure 11).

- b) A helicopter hovering above the observer will produce noise levels above 90 dBA when the helicopter is only 100 feet above, and around 75 dBA at 500 feet. This situation occurs only briefly in the Na Pali area, usually when the helicopter pilots approach waterfalls at the head of the valleys to afford passengers a better look at them. At other times helicopters do not linger over any particular area.
- c) A typical helicopter pass-by as heard by an observer in a valley will create peak sound levels of 60-65 dBA for a few seconds (15-20 dBA above ambient). The helicopter will be audible for about one minute as it passes by.
- d) A hiker on the trail near the ocean will hear a helicopter pass-by for a longer period of time, measured at 60-90 seconds. Peak noise readings, again lasting only a few seconds, would be in the 60-65 dBA range for the normal helicopter cruising altitude.
- e) On a peak summer day, a hiker on the Kalalau Trail would hear a maximum of 18 to 22 helicopter pass-by's. This would create noise levels above the background lasting between 27 and 33 minutes per day. This situation would take place only rarely. A more common daily exposure to helicopter pass-by's would be about 6-10 a day, with cumulative length of 9-15 minutes. Hikers deep in the valleys would be exposed to helicopter noise less frequently, and for a smaller length of time.
- f) Noise levels are greatest at take offs and landings, exceeding 100 dBA 50 feet from the pad, and not reaching 65 dBA until the observer is 2,500 feet from the pad. Typical noise exposure during take off at Kalalau Beach is shown on Figure 10. It can be seen that moving the pad reduced the noise exposure at the main

beach area by at least 10 decibels."

B. Hazards to Public Health and Safety

The management plan's main mitigating measures for public health and safety involve public information, warnings and plans for emergency rescues. Most of the hazards will remain. There is no practical way to reduce such hazards as high surf, ocean currents and flashfloods. They can only be avoided. Potable water systems and modern sewage disposal systems are also impractical to construct and maintain. Basic training for backcountry visitors involves a respect for potential hazards to be avoided and good health and sanitation habits. In fact, dealing with hazards is part of the backcountry recreation experience which people seek in trying to live in close harmony with nature.

IV. Alternatives to the Proposed Action

A. Greater Resource Protection

Protection of the resources would be considerably enhanced if sensitive areas were closed to public use. Unfortunately, many of the richest archaeological values coincide with today's best sites for intensive recreation use. Research could be conducted to gain the maximum knowledge remaining in these areas without further deterioration related to public use or possible public interference to the field research itself.

The strategy of the management plan, based on existing knowledge, is to avoid sensitive resources which could be damaged by public use wherever this is feasible. Some archaeological salvage is also planned. Unfortunately, the extent of resource damage, if any, caused by public use is not known but periodic monitoring of the established baseline surveys is expected to indicate change in the condition of significant resources.

B. Amount of Public Use

The amount of public use of the Na Pali Coast depends primarily on visitor satisfaction in enjoying the natural scenic beauty, solitude and lack of modern facilities. The established carrying capacities of the existing campgrounds are somewhat arbitrarily based on a combination of visitor satisfaction and the limited number of pit toilets. In the future the existing campgrounds could be expanded and/or new campgrounds and appropriate access could be established in one or

more of the park units. Alternatively for reasons of visitor satisfaction or resource protection, the amount of camping could be reduced and campgrounds could also be reduced in size or relocated. Changes in use will depend largely on further research on resource protection needs and visitor satisfaction monitoring.

C. Commercial Access Needs

The alternative involving commercial access involve a complex mix of variables. There are two means of commercial access, boat and helicopter. Boat landings are feasible at four beaches during the summer months while helicopter landings are feasible at five beaches and three or four valleys inaccessible from beaches. Finally, there are four potential types of visitors to consider; campers, day use visitors, brief reststop visitors and those visitors simply viewing the park from the ocean or the air. In developing the management plan, each variable has been considered separately for each park unit.

Two commercial tour boat landing sites and two heliports are currently authorized for the Na Pali Coast Management Plan area. Five helicopter landing sites were requested by two commercial tour operators and at least four boat landing sites are feasible. From Haena to Kalalau Valley where access by hiking is available, the need for commercial access depends on visitor demand and visitor satisfaction rather than on access needs. From Kalalau Valley to Milolii commercial access needs are closely related to the carry capacities of these valleys since no land access is feasible.

While commercial access to otherwise inaccessible areas has not been questioned for day use and overnight use, access for brief reststops is being seriously questioned. How much is the visitors' experience enhanced by being allowed to land for a short time as part of a tour group attached to a modern means of transportation? If reststops are located near campsites or other areas where campers and hikers are located, the adverse impact on these other visitors is apparent. Reststops in isolated valleys would largely eliminate this problem except for overflights of neighboring valleys, and allow short visits to otherwise inaccessible areas. The need for reststops will be reviewed as part of the ongoing planning for the Na Pali Coast. Relocation of the existing heliports is also being considered in order to minimize their impact on the adjoining campsites.

V. The Relationship Between Short-Term Uses and Long-Term Productivity

The purpose of this management plan is to preserve the recreation resources of this area for future generations. In preserving the area no short-term or long-term irreversible commitment will be limited to trail access, grass heliports and primitive campgrounds.

VI. Irreversible and Irretrievable Commitment of Resources

The only significant irretrievable commitment of resources are the manpower, supplies and equipment to operate the park and access to vehicles. To the extent any natural or cultural resources are destroyed by visitation despite protection measures, the loss of these resources is irretrievable.

VII. Other Interests and Consideration of Government Policies Offsetting Adverse Environmental Effects

The Hawaii State Plan includes two major objectives and policies directly related to the management of the Na Pali Coast. Section 12, Objective and policies for the physical environment-scenic, natural beauty and historic resources states, "Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty and multi-cultural/historical resources." Section 23, Objectives and policies for socio-cultural advancement - leisure states, "Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic and recreational needs for present and future generations." One of the policies of the leisure objective is to, "Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological or biological values."

The Coastal Zone Management Act also includes both resource protection and recreation use in its purpose. In fact, it is more specific in its purpose to provide public access to publically owned beaches and natural reserves. The management dilemma of protecting resources while simultaneously allowing public recreation use is the dominant concern of the Na Pali Coast Management Plan.

The State Environmental Policy Act establishes specific guidelines for parks, recreation and open space. It again calls for protection of resources for public recreation, education and scientific use. Protection of shorelines

from man-made facilities is specifically mentioned and what is most fitting for the Na Pali Coast, the promotion of open space for its natural beauty as an ennobling, living environment.

VIII. Summary of Unresolved Issues

Issue - Should commercial helicopters and tour boats be allowed to land on the Na Pali Coast?

Milolii, Nualolo Kai, and the valleys between Milolii and Kalalau cannot be reached by trail or other overland access so commercial access is essential. Any commercial landings beyond those which provide this essential service are only provided as a public convenience.

Issue - What is the optimum number of visitors for each of the day use destination areas, campgrounds and trails within the Na Pali Coast area?

The carrying capacities of the campgrounds established by the management plan are arbitrary figures based on field experience from the past few summer seasons. These figures are expected to be refined by the future monitoring of public use and significant resources. The issue also involves a perception of visitors' tolerance of other people while seeking a wilderness type experience. Future monitoring should include data on visitor satisfaction.

Issue - What is the least costly way to provide for the satisfactory preservation of archaeological features?

The main resource presentation concern related to public use is the impact of visitors on archaeological features in most existing and potential campgrounds. The archaeological survey report recommends the type of salvage needed for each site or each campground. Unfortunately, this salvage is costly and time consuming so alternative ways of accomplishing the salvage work or reducing the amount of work required will be explored. The outcome of this study will also have an impact on the consideration of other potential sites on the Na Pali Coast for intensive recreation development.

IX. Necessary Approval

In addition to the environmental impact statement requirements the following actions are required by government agencies in order to establish and operate the management area as a state park.

1. Following the approval of an Environmental Impact Statement a Special Management Area application will be filed with the County of Kauai.
2. Following the approval of a Special Management Area application a Conservation District Use Application will be filed with the Department of Land and Natural Resources.
3. After all regulatory requirements have been met, those portions of the management area which are now in the forest reserve will be withdrawn from this state land encumbrance. The entire management area, except for the Kalalau Valley area already assigned to State Parks by executive order, will then be designated as a state park by a Governor's executive order.
4. Heliport licenses will be requested annually to renew existing heliport licenses and/or establish new heliports.

X. References From Previous Environmental Impact Statements

State Parks Division, Department of Land and Natural Resources, 1977. Haena - Na Pali Coast, Environmental Impact Statement Notice of Preparation

Pacific Seafarer, Inc., 1978. Environmental Impact Statement for Boat Tour Operations to the Na Pali Coast

Papillon Helicopters, Ltd. and Kenai Air Hawaii, Inc., 1978. Environmental Impact Statement for Helicopter Landings on the Na Pali Coast

XI. Organizations and Persons Consulted

The Environmental Impact Statement Notice of Preparation for the Na Pali Coast Management Plan is being sent to the following organizations:

- Airports Division, Hawaii Department of Transportation
- Hawaii Department of Health
- Kauai County
 - Planning Department
 - Kauai County Council
 - Kauai Fire Department

- Kauai Police Department
- Civil Defense Agency
- Parks and Recreation Department
- Department of Public Works
- Papillon Helicopters, Ltd.
- Jack Harter Helicopters
- Kenai Helicopters, Inc.
- Na Pali Zodiac
- Kauai Fish and Wildlife Advisory Committee
- Kauai Hunters Society
- Shoreline Protection Alliance
- Kauai Outdoor Circle
- Conservation Council for Hawaii
- Hawaii Trail and Mountain Club
- Hawaii Audobon Society
- Sierra Club, Hawaii Chapter
- Life of the Land
- Kauai Historical Society
- Archaeological Research Center
- University of Hawaii Environmental Center
- Kauai Community College Anthropology Club
- Sea Grant Marine Advisory Program
- Hawaii Institute of Marine Biology

Mr. Koizumi

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February 12, 1981

in the management plan adopted in September 1980 are as follows:

	<u>Visitor Use Capacities</u>		
	<u>3/79 to 9/80</u>	<u>9/80 to Present</u>	
Hanakapiai	100	30 (campers only)	
Hanakoa	50	20	
Kalalau	120	80	
Honopu	30	Day use only	
Nualolo Kai	30	20	
Milolii	30	30	

This reduction in visitor capacities was made largely because of unsatisfactory sanitation conditions and general overcrowding we were experiencing. The visitor capacity of Kalalau was reduced to 80 persons in January, 1980 and proved to be a much more satisfactory number this past summer when the capacity was reached.

3. The Department of Health felt that 3 out-toilets at Milolii are adequate but 4 out-toilets at Kalalau for 80 campers are not adequate. It was recommended the Kalalau visitor capacity be reduced to 60 or less per day unless we can maintain a very high standard of maintenance. During the heavy use summer period, June, July and August, both toilets and rubbish pits are maintained daily. Unfortunately, there apparently are no standards for out-toilets and no established monitoring program. Visitation records indicate that visitor capacities are only being reached during the summer months. With additional summer student manpower we are able to maintain high standards during this time.

We strongly share your public health concerns and would like to establish sound health standards for the operation and maintenance of all our primitive backcountry facilities. This is one of the goals of the management plan (Item C2, Pg. 32 & Item C5, Pg. 34). Your assistance in monitoring our program and developing appropriate health standards would be greatly appreciated.

Very truly yours,

SUSUMU ONO

SUSUMU ONO
Chairman of the Board



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

Mr. James J. Yamashiro
Administrator
Division of State Parks
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Yamashiro:

EIS Preparation Notice
Na Pali Coast Management Plan
Na Pali Coast, Kauai

The Environmental Center has reviewed the EIS Preparation Notice for the Na Pali Coast Management Plan with the help of Charles Lamoureux, Botany; Bill Burke, General Science; Jacquelin Miller, Alexis Cheong Linder, and Barbara Vogt, Environmental Center.

The following comments address specific areas of concern identified by our reviewers.

Archaeology

Although preservation of cultural heritage is given high priority, there are inconsistencies which undermine this objective. Relocation of a helipad at archaeological site 3200-201-G in Milolii Valley is a prime example of an action that could damage rather than enhance the historic features of the area. The rationale for locating the helipad in this particular area should be fully addressed in the EIS. We agree that the present helipad location should be relocated in order to minimize disturbance of the Newell Shearwater nesting colony. However, it should not be at the expense of significant archaeological features of the area. If the State plans to limit use of the Na Pali Coast by commercial helicopter businesses will it be necessary to implement plans for a third helipad? The EIS should address the significant archaeological features which would be impacted by this proposal. If the Nualolo Aina area is being considered as a potential site for helipad use then the EIS should address the impacts of this proposal.

The State hired contract archaeologist Myra Togomori Tuggle to conduct a survey of the Na Pali Coast. This study should be included in the forthcoming EIS or a summary of the pertinent findings.

AN EQUAL OPPORTUNITY EMPLOYER

Mr. James J. Yamashiro

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January 15, 1981

Archaeological site identification in Appendix B would be more meaningful if maps were included which would indicate both archaeological sites and their proximity to other proposals of the plan. Will the recommendations in Appendix B be implemented as mitigative measures for the sites in question? What are the plans for continued reconnaissance and more comprehensive archaeological work?

Flora and Fauna

The botanical assessment proposes several recommendations to preserve native vegetation, however, these fail to appear in the body of the text as methods of preservation. These recommendations should be incorporated in the EIS as mitigative measures for the protection of native flora.

What is the evidence to substantiate the statement (p. 7), "Too few goats reduce hunting opportunities and allow exotic vegetation to proliferate"? There is a conflict between the objectives of preservation of native plant life and the maintenance of the goat population for recreational hunting. Utilizing goats to graze down exotic species as a control measure is an ineffective means for preservation of native flora. Goats are noted for having notoriously indiscriminate tastes. The negative effects of goats are listed in numerous places throughout the EIS (Appendix C, pp. 4, 5, 9; supplement to Appendix C, pp. 9 and 10 and Appendix D, p. 9). An article by C.F. Yocum on "Ecology of feral goats in Haleakala National Park, Maui, Hawaii" (American Midland Naturalist 77:418, 1967) states, "My studies indicate that goats must be eliminated from the National Park lands if these areas are to be reserved for the future peoples of the world to see native Hawaiian vegetation under as natural conditions as man can maintain." Hawaii Volcanoes National Park is in the process of eliminating goats from the park area. Additionally the State is directed by Federal court order to remove feral sheep from the critical habitat of the Pali bird on Mauna Kea. Both measures are directed at preserving native Hawaiian vegetation. What is the definition of "carrying capacity" for goats in the area? What studies been conducted to determine such capacities?

The maintenance of goat populations for hunting purposes conflicts with plans to preserve native flora; studies to determine carrying capacities for the Na Pali area and determination of impacts of goats on native and exotic vegetation must be undertaken.

The proposed research program to study the impact of three remaining cattle in the area is unnecessary. Resources are better utilized to study the impacts of the goat population rather than three heads of cattle (the population number is too small to draw conclusions of statistical significance).

We agree that wild cat populations must be controlled in order to protect native birds in the area. What "authorization from the Humane Society" (p. 25) is required in order to trap rats and feral cats?

Helicopters

There is widespread agreement that helicopters are annoying to those visitors who travel to the Na Pali Coast for the quiet solitude of a wilderness experience. State survey teams were also annoyed by the noise caused by low flying aircraft. Feral animals are also frightened by the noise caused by helicopters and consequently hide in inaccessible

Mr. James J. Yamashiro

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areas. Potentially this could result in an increase in feral goat populations and frustrated hunters. Thus, the departments recommendations to limit commercial helicopter flights at low levels, avoid areas frequented by campers and hunters and to limit landings to specific areas is certainly appropriate.

Yours very truly,

Diane C. Drigot

Diane C. Drigot, Ph.D.
Acting Director

LAIU

cc:

Charles Lamoureux
Bill Burke
Jacquelin Miller
Alexis Cheong Linder
Garret Kawamura
Barbara Vogt

February 12, 1981

Dr. Drigot

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February 12, 1981

Diane C. Drigot, Ph.D.
Acting Director
Environmental Center
University of Hawaii at Manoa
Crawford 317, 2250 Campus Road
Honolulu, Hawaii 96822

Dear Dr. Drigot:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice.

The objective of the Na Pali Coast management system is to protect cultural and natural heritage features, while also allowing visitor use. Unfortunately, today's visitors are attracted to many of the same beach areas which were important to early Hawaiians, so some compromises are being made in both archaeological site protection and modern visitor use. It is our intention to make the archaeological instrument maps recommended in Appendix B and use these maps as base maps for locating modern use areas with minimal impact on archaeological features. Features which are unavoidably impacted will be salvaged. If and when existing heliports, campgrounds, trails or other facilities are significantly changed, relocated or enlarged, we anticipate a Supplemental Statement will be required. As indicated on page 2 of the plan, the plan will be evaluated within two years.

Appendix B, is the summary and recommendation section of the H. Tomonari-Tuggle report and we have amended the first page to indicate this source. The report itself includes 135 pages of text plus numerous figures and plates and, therefore, was not practical to duplicate for the EIS. It is our policy not to include site maps in public documents in order to reduce pot-hunting. Site recommendations in Appendix B, which are to be implemented are included in Section IV of the plan under the recreation resource management for each unit. As indicated on pages 6 and 26 of the plan, we feel an archaeological research program for the entire area is needed before undertaking additional archaeological work. This program development has not been scheduled but input and review by all interested parties will be required.

Since the valley floors, where visitor use is concentrated, are dominated by exotic vegetation, botanical interests were not treated in detail for each park unit unless a particular preservation concern was identified. (See page 6.) Recommendations appearing in Appendix C, were not site specific and were therefore put in Section III of the plan with other general objectives.

Although there is a conflict between preserving native plant life and maintaining goat population, the plan again attempts to protect heritage values while also maximizing suitable visitor use. We do not equate the Na Pali Coast with either Haleakala National Park or Mauna Kea. With the exception of the area between Hanakapiai and Hanakoa, which is to become a natural area reserve, the native vegetation is limited to small areas, often associated with cliff faces. We are not aware of any serious damage to existing native plant or animal life, which would justify an attempt to eradicate goats and are not attempting to expand native habitats. Wildlife biologist's field observations, photo station evidence and some population estimates indicate goat populations on the Na Pali Coast have probably been reduced as much as 50% over the past twenty years. These observations also indicate goats do control plant life in the open, drier portion of the Na Pali Coast they prefer and a large majority of this vegetation is exotic. The carrying capacity for goats is not well defined and typically the goats are not evenly distributed over their normal range. Carrying capacities are determined largely by range conditions and most goat control has been done by adjusting hunting regulations. We agree there is no need to study the impact of cattle unless there is some value determining the previous impact of cattle when Kalalau Valley was used for a grazing operation.

The Kawai Humane Society has informed us that permission is required to control our rat and feral cats problems and we have complied with this request and received written permission.

We expect to submit the Draft Environmental Impact Statement by March, 1981 and would be glad to answer any questions or provide additional background information to assist you in your review of this document.

Very truly yours,

1975000000000

SUSUMU ONO
Chairman of the Board

BRIAN K. NISHIMOTO
PLANNING DIRECTOR
AVERY H. YOUNG
DEPUTY PLANNING DIRECTOR
TELEPHONE 841-3419



EDUARDO E. MALAPIT
MAYOR
STATE PLANNING
DIVISION
NOV 16 5 46 AM '80

COUNTY OF KAUAI
PLANNING DEPARTMENT
4253 KICE STREET
LIMU, KAUAI, HAWAII 96766

November 17, 1980

Mr. James J. Yamashiro, Administrator
Division of State Parks
P. O. Box 621
Honolulu, Hawaii 96809

Subject: Na Pali Coast Management Plan

Within the last few years, the Planning Commission has reviewed two (2) Special Management Area Use Permit applications for the Na Pali Coast; the first being for commercial boat landings, while the second involved helicopter landings. In both cases, we stressed the need for a management plan to control such activities and to protect waste disposal, wildlife protection, public safety and education, and density controls.

A management plan has been long overdue for this area and we welcome its formulation at this time. The thrust of the plan seems to focus on controlling density for each of the camping areas along the coast. It further addresses all of the problems mentioned above, but only through proper maintenance and enforcement can these problems be eliminated or reduced. Controlling access and the number of visitors allowed to the area by requiring camping permits and provisional permits for the boat and helicopter operations is a good management objective which does appear feasible. The capacities set for each of the camping areas are acceptable also.

Mr. James J. Yamashiro, Administrator
Page 2
November 17, 1980

Because the Na Pali Coast is one of the major scenic areas on Kauai, its value is worthy of protection, and we only hope that the plan can be carried out through the provision of adequate personnel and funding. Careful monitoring and maintenance is essential to assure the preservation of the natural beauty, wildlife and archaeological resources of the Na Pali Coastline.

Brian K. Nishimoto
BRIAN NISHIMOTO
Planning Director

cc: Mayor Malapit

February 12, 1981

Mr. Brian Nishimoto
Planning Director
Planning Department
County of Kauai
4280 Rice Street
Lihue, Kauai, HI 96766

Dear Mr. Nishimoto:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice.

We appreciate your general endorsement of the management plan and certainly agree that adequate staffing and monitoring are essential in carrying out the plan. The Draft Environmental Impact Statement is currently being prepared and we expect to submit this document to the Office of Environmental Quality Control by March, 1981. Shortly after that, we anticipate the submittal of a Special Management Area Use Permit for this project.

Your continued interest in this project will be appreciated.

Very truly yours,

W. F. Fikuchi
SUSUMU ONO
Chairman of the Board

William Y. Kikuchi
KCC Anthropology Club
Fauai Community College
Lihue, HI 96766

Nov. 24, 1980

Mr. James Yamashiro
Administrator
Division of State Parks
DLNR
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Yamashiro:

Thank you for the EIS Statement on the Na Pali Coast Management Plan. Your consideration was very much appreciated.

The recommendations of the Kauai Community College Anthropology Club and myself personally are as follows:

- 1) Consider the Na Pali as an archaeological bank.
- 2) Excavations be allowed only in high impact areas where construction of sub surface structures are planned.
- 3) Other excavations not be allowed to anyone or to any institution until a total research plan encompassing the entire Na Pali is developed and approved by the Historic Sites Committee of the County of Kauai.
- 4) Research in Na Pali be part of a total plan.

Again mahalo for your consideration and the opportunity to respond to the EIS.

Sincerely yours,

William Y. Kikuchi

Dr. William Y. Kikuchi
advisor
archaeologist

February 12, 1981

Dr. William Kikuchi, Archaeologist
KCC Anthropology Club
Kauai Community College
Lihue, Kauai, Hawaii 96766

Dear Dr. Kikuchi:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice.

Our comments on each item of your response are as follows:

1. We are incorporating your suggestion of viewing the archaeological resources as an archaeological bank with our submittal on page 3 of the project description which describes the cultural values as, "a unique laboratory for the study of prehistoric Hawaiian culture and for the preservation and presentation of archaeological remains."
2. As noted in Appendix B (page 9), the archaeological consultant, Myra Jean P. Tomonari-Ruggie, has recommended that research be conducted at several sites being impacted by park visitors as well as at existing park facilities. In order to avoid the need and expense of excavations wherever possible, we expect to use archaeological instrument maps as base maps for campground improvements, thereby minimizing conflicts between recreation use and preservation of archaeological resources.
3. Before being finalized, a research plan for the entire Na Pali Coast, as included on page 26 of the project description, will certainly involve a review process which will include the Historic Sites Committee of the County of Kauai and others.
4. It has been noted by a number of archaeologists that research in Hawaii should be incorporated into regional research designs, however, as yet no such plans have been produced.

Dr. Kikuchi

- 2 -

February 12, 1981

Your comments are being considered in the preparation of the Na Pali Coast Management Plan Draft Environmental Impact Statement. We expect this document will be scheduled for a 30 day public review period by March, 1981. Copies may be obtained from the Office of Environmental Quality Control, 850 Halekauwila Street, Honolulu, Hawaii 96813 (telephone 548-6915).

Thank you for your interest in this project.

Very truly yours,

18:CSUNUJ0:0

SUSUNU ONO
Chairman of the Board

James Yamashiro
 Administrator
 Division of State Parks
 Dear Sir:

①
 State of California
 STATE PARKS
 Dec 3 10 43 AM '80

Following are my comments on the Na Pali Coast Interpretive Plan E.I.S. Notice of Preparation.

1) With all of the money being spent on this project, and in view of the significance of the Na Pali State Park, it is ridiculous that copies of this notice of preparation were not more widely distributed. Following the public meeting concerning the notice of preparation, I wrote a summary of my comments and sent this to the D.L.H.H. I feel that this should be sufficient reason for your sending me a copy of the Notice of Preparation. Instead, upon hearing of the deadline for comments, I called the D.L.H.H. and was told that the only way I could review a copy would be to come into their office and read it over. No copies were sent to local public libraries. The Division of State Parks should make an effort to improve their public review procedures.

2) Pg. 13: "In the summer, commercial access should be by inflatable boats only". I fully agree with this; in view of the number of hikes into the supposed wilderness area of Kalahele during summer months, it is ridiculous to allow the noisy intrusion of helicopter landings and dropoffs during the summer months. The section on pg. 42 which helicopter landings are allowed year round in Kalahele should be amended to its original form where helicopter landings were to be allowed only during low winds when there is no bird access. This is especially important in view of the visitor satisfaction surveys which evidenced great dissatisfaction with helicopter activities. I can't understand the reason for changing the original plan; it appears to be special interest legislation which totally ignores the results of the visitor satisfaction surveys and the wilderness concept for the park.

②

3) Pg. 25: Concerning great eruptions... The proposed effort to maintain large goat populations are ecologically unsound, and will only contribute to further degradation of the environment. Instead, goat control programs should be instituted, especially in sensitive areas. To utilize feral goats as a means of controlling exotic vegetation will ensure that the most noxious weeds (i.e. Lantana) continue to expand their range and coverage, that native plants will be further reduced, and that erosion into streams will worsen. Needed is a plan for reducing goat impacts, especially in areas near streams, near rare and endangered plants, and near the natural area reserves. Increased goat hunting and more open season hunting time could be a good first step.

4) Pg. 29: "Helicopter flights will be established in order to minimize disturbances to visitors..." This should be done now and included in this Notice of Preparation of the E.I.S. The flight path agreement should also extend over the neighboring Kokee State Park, where low-flying helicopters are a persistent annoyance. Helicopters regularly make low-level flights over Kokee State Park as they pass between Waimea Canyon and Kalahele Valley - Na Pali Coast. In exchange for allowing their special landing privileges in the State Park, the helicopter companies should be required to agree to non-intrusive flight paths over all of the north and east Na Pali State Park lands.

5) The helicopter companies should not be allowed to use off 75% of the maximum visitor capacity of Kilauea. It is very likely that the helicopter companies will utilize their maximum allowable dropoffs in the future, which bring mostly non-local visitors to the park. This would result in a situation where only nine local residents would be able to come to Kilauea by boat at any one time. I am sure that there are many times when more than nine local people have come into or out of Kilauea in Kilauea. The 75% allowable drop off limit is excessive and should be lowered below 50%. I also feel that it is not necessary and not good policy to allow the helicopter rest-stops in Kilauea, the helicopter noise will practically be continuous there during the busy summer months, completely destroying the wilderness quality of that popular camping spot.

February 12, 1981

Mr. David Boynton
Box 87
Kilauea, Kauai, HI 96754

Dear Mr. Boynton:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice. Please accept our apologies for not sending you a copy of the notice of preparation. Your latest comments will be considered as were your June 26, 1980 comments on draft 3 of the management plan and your input at the public meeting held earlier in June.

In adopting the management plan, the Board of Land and Natural Resources amended the plan to include helicopter landings at Kalalau throughout the year. The Board has also directed us to continue to develop the plan, including a review of the present plan, and provide detailed plans of key park units. This work is to be completed before June 30, 1982. We are monitoring the impact of the present helicopter landing restrictions at both Kalalau and Miihii and it is hoped this data will establish the merits of these restrictions. The plan is being amended on page 13 to indicate access by inflatable boats only will be considered as a future alternative in Kalalau. We also expect to consider other alternatives including heliport relocation and the need for a separate heliport for rest stops.

As the management plan indicates, we would like to establish helicopter flight paths. Right of entry agreements have been established for two helicopter companies, authorizing them to land on the Na Pali Coast. The agreement establishes approach and departure landing patterns and stipulates scenic flights shall be flown at not less than 1,000 feet elevation above sea level. While we share your concern for further restrictions on low flying helicopters throughout Kauai, there are jurisdictional and associated enforcement problems to be overcome for inflight activities.

Concerning goat populations, our wildlife biologists indicate present numbers are generally lower on the Na Pali Coast than they were a number of years ago. Our intention is to maintain a goat population on a sustained yield basis, which is environmentally

6) Appendix D, pg. 9: The threatened Newell's Shearwater has been found in Miihii, but the nesting areas of two other very rare native seabirds have never been found on Kauai. An effort should be made by the D.L.H. to determine if the Harcourt's Storm Petrel or the Dark-rumped Petrel, juveniles of which are found each year on west Kauai, nest within the proposed park boundaries. A breeding season survey utilizing sound recording equipment might very well locate further Newell's Shearwater nesting areas, and might lead to the discovery of the nesting locations of the two very rare petrels. John Hancock has utilized this technique to discover what is very likely a breeding location for the Harcourt's storm petrel in Hanalei Valley, so the method can be effective.

Thank you for this opportunity to comment.

Aloha,

David Boynton
Nov. 28 1980.

Mr. Boynton

February 12, 1981

- 2 -

sound. The wildlife and botanical studies done as part of the management plan did not identify any existing areas where goats were impacting our native ecosystem. If any such areas are identified, we will certainly try to protect these plants by the most effective means. Similarly, if we learn of native bird nesting areas we will take appropriate protective measures. A general sea bird study was initiated by the Department of Land and Natural Resources in 1980, but the present focus is on the study techniques such as censusing, required before inventoring begins.

The Draft Environmental Impact Statement is currently being prepared and we expect to submit this document to the Office of Environmental Quality Control by March, 1981. Copies may then be obtained from the Office of Environmental Quality Control, 550 Halekauwila Street, Honolulu, Hawaii 96813 (phone 548-6915).

Thank you for your continued interest in this project.

Very truly yours,

/s/ SUSUMU ONO

SUSUMU ONO
Chairman of the Board

2-24

DEPARTMENT OF
STATE PARKS
Honolulu
February 12 21 PM '81

State of Hawaii
Department of Land and Natural Resources
Division of State Parks
P.O. Box 521
Honolulu, Hawaii 96809

Dear Mr. Yamashiro:

Your acceptance of the importance of preserving the willard ~~area~~ ^{area} is well taken. You admit that preserving the natural features is more important than their modification for agricultural, religious, economic or other purposes. Yet, you invite this area ~~to be~~ ^{to be} still beautiful unspoiled area with ~~no~~ ^{no} ~~loss~~ ^{loss} of ~~its~~ ^{its} ~~natural~~ ^{natural} ~~features~~ ^{features} that is going to ~~be~~ ^{be} ~~lost~~ ^{lost} ~~to~~ ^{to} ~~the~~ ^{the} ~~public~~ ^{public} ~~as~~ ^{as} ~~it~~ ^{it}.

We would accept a slow ~~in~~ ⁱⁿ ~~crease~~ ^{increase} and/or a view from a guard's vantage point or some controlled flights from helicopters or even sorties by zebras. All forms of ingress and egress described accepted provided the preservation of the natural features of the area is considered before all other considerations. You have already embarked on a program to enlarge your acceptance.

The park system in its everyday functions is already modifying the natural features of the area by increasing the visitor capacity and always to the point where there is no policing or control of the area and its inhabitants. Disgusting situation at the least. I would like to use more descriptive words but I hope you get the message.

The helicopters have been landing at all points at will and even at the Kokoa park fronting the museum. The zebras have been making any number of sorties at their discretion and not yours. In both these two means of transportation your numbers don't mean a thing. You could have guesstimated them and you would have done just as well.

The park boundaries as you so stated on page 4 do not have to encompass the

GEORGE R. ANTOSH
Secretary of Hawaii



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 611
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES
5001A, HAWAII
SUITE 101, 1st FLOOR

DIVISIONS:
CONSERVATION AND ENFORCEMENT
CONTINGENTS
FISH AND GAME
FORESTRY
LAND MANAGEMENT
PLANT LIFE
WATER AND LAND DEVELOPMENT

February 12, 1981

Mr. Jim Palmeira, President
Kauai Hunters Association
P. O. Box 435
Kapaa, Kauai, Hawaii 96746

Dear Mr. Palmeira:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice.

We share your concern for the management problems referred to in your response. The management plan was developed in response to these problems and our visitor count data, observations and response from recent visitors indicate we are making progress in reducing crowded conditions and associated helicopter activities. There is certainly a need to improve our management and we hope the Kauai Hunters Association will help monitor our efforts, at least during peak use periods which coincide with the hunting season.

The Draft Environmental Impact Statement is currently being prepared and we expect to submit this document to the Office of Environmental Quality Control by March, 1981. Copies may then be obtained from the Office of Environmental Quality Control, 550 Halekauiwa Street, Honolulu, Hawaii 96813 (telephone 548-6915).

Thank you for your continued interest in this project.

Very truly yours,

SUSUMU ONO

Chairman of the Board

area described. The added area doesn't simplify visitor management and enforcement. You can achieve that by taking a small section of the approaches to the Haena end of the Napali Coast. The remainder should be left in its natural state and administered by a department other than the park system. The park system should regress back to trying to control and manage the existing Kokee and Lygate Parks and others and when and if they show competence in administration and control to these parks than "sayes". Not before. Anything done before will be done in too much haste and we will be eternally sorry.

Sincerely,
Jim Palmeira

Jim Palmeira - President - Kauai Hunters Association

February 12, 1981

Dr. Hammatt

- 2 -

February 12, 1981

Dr. Hallett H. Hammatt, Sr. Vice President
Archaeological Research Center Hawaii, Inc.
P. O. Box 285
Lawai, Kauai, Hawaii 96765

Dear Dr. Hammatt:

Thank you for your written response to the Na Pali Coast Management Plan Environmental Impact Statement Preparation Notice.

We share your concern that archaeological research be done in a professional manner, that all work conform to an overall plan and that good communication be maintained among all interested parties during the planning as well as the actual research activities. Your continual review of future archaeological activities will be appreciated.

In regard to your specific comments we offer the following response:

1. The use of college field school students certainly has shortcomings, but we feel there should be a place for students in an extensive long-range program which is properly planned and supervised.
2. In the past, agricultural sites have not been of major interpretive value but we certainly agree they could be, particularly when an entire valley system can be seen. However, as indicated on page 5 of the project description, we do not foresee many opportunities for developing interpretive programs on the Na Pali Coast.
3. There certainly are pros and cons to letting some types of vegetation grow uncontrolled on archaeological sites, but it is not feasible at this time to maintain the vegetative growth over the extensive archaeological agricultural systems occurring throughout the Na Pali Coast valleys.

Your comments are being considered in the preparation of the Na Pali Coast Management Plan Draft Environmental Impact Statement. We expect this document will be scheduled for a 30 day public review period by March, 1981. Copies may be obtained from the Office of Environmental Quality Control, 550 Halekaiwila Street, Honolulu, Hawaii 96813 (Telephone No. 548-6915).

Thank you for your interest in the project.

Very truly yours,

/S/SUSUMU OKNO

SUSUMU OKNO
Chairman of the Board

ARCHAEOLOGICAL RESEARCH CENTER, HAWAII, INC.

P. O. Box 285; Lawai, Kauai, Hawaii 96765; Ph. 332-8521

DEC 17 10 00 AM '80

17
December
1980

Mr. James Yamashiro
Administrator
Division of State Parks
Department of Land & Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Comments on Nā Pali Coast Management Plan
Environmental Impact Statement.

Dear Mr. Yamashiro:

Please excuse the late response to your request for written comments on the above subject. In spite of the lateness we feel it is still worthwhile to comment on the archaeological aspects of the plan.

Although we are in general agreement with the proposed program of preservation and minimal impact of archaeological resources, we offer the following specific comments:

- 1) On Page 26 it is suggested that a long-term summer field school for college students be developed. Efforts to accomplish this in the past have rarely been short of disastrous to the quality and continuity of Hawaiian archaeology, and the publication and dissemination of information has suffered from it because of poor coordination and disorganization.
- 2) Under recreation resource management for specific valleys, archaeological mapping and subsurface testing is recommended. We submit that all archaeological research done in the area be in accordance with a well integrated plan for archaeological data recovery by professional archaeologists with the backing of organizations and staffs with the expertise and continuity to serve the needs of the public and scientific community. Precestral research is not advisable particularly in this critical area.
- 3) On Page 6 of Appendix B (last paragraph) there is reference to agricultural sites as being of little ethnic significance and interpretive potential. We do not agree with this evaluation and

Mr. James Yamashiro
December 17, 1980
Page 2

maintain that agricultural features, particularly those in the Nā Pali area have some of the highest ethnic significance and interpretive potential of any sites in Hawaii.

- 4) Letting vegetation grow uncontrolled on archaeological sites to hide them from vandals has pros and cons. Depending on the type of vegetation, uncontrolled growth can destroy a site more effectively than any army of vandals.

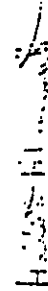
Our general observations are as follows:

- 1) That archaeological research in Nā Pali be conducted by qualified and experienced organizations with professional staff and facilities and who have demonstrated ability to produce reports in a timely manner.
- 2) That any archaeological research done there in the future be coordinated with the County of Kauai and specifically the Mayor's Committee on Historic Sites.
- 3) It is our concern that the Nā Pali Coast be retained as an archaeological "bank" and that whatever research is conducted there be accomplished according to a plan and by experienced and qualified professionals who produce comprehensible information for the public and scientific community.

If there are any questions concerning the above or if we can be of further assistance to you, please do not hesitate to contact me.

Nā Kau a Kau.

ARCHAEOLOGICAL RESEARCH CENTER HAWAII, INC.



Hallett H. Hammatt, Ph.D.
Senior Vice President

HHH:ds

812943 Kalakaua Avenue, #307
Honolulu, Hawaii 96815
December 22, 1980

Mr. Susumu Ono, Chairman
Board of Land and Natural
Resources
P. O. Box 621
Honolulu, Hawaii 96809

Re: Ma Pali Coast Management Plan

Dear Mr. Ono:

On March 27, 1979 I wrote the Environmental Quality Commis-
sion, with a copy to your department, regarding the danger of
Clidemia hirta being introduced into the Ma Pali Coast area.
This would be a major environmental tragedy. Permitting helicop-
ters to make landings (other than emergencies) will substantially
increase the chances of this weed being started. The EIS had
not dealt specifically with this critical matter. Having receiv-
ed no response I again wrote the Commission on July 17, 1979,
a copy of which was sent to your department. On July 24, 1979,
the Commission replied saying I should receive a response from
your department.

To date, I can find no response. I have reviewed the Ma
Pali Coast Management Plan EIS. While the EIS mentions the danger
of introducing exotic plants, it makes no specific reference
to the special danger of this plant being introduced and the
fact that the increased human traffic generated by helicopter
access is critical.

No management plan should be adopted until members of the
Board are fully aware of the environmental degradation that can
result from the introduction of this plant and that human traffic,
substantially increased by either boats or helicopters, is a
critical factor. The EIS should spell out the impact Clidemia
hirta has on other plants, the inability to stamp it out and
the ease with which the seeds can be carried on shoes of persons
who have walked in infested areas elsewhere in Hawaii.

I hope this deficiency in the EIS can be corrected.

Sincerely,

Morris G. Fox
Morris G. Fox

MGF:syo

JAN 22 1981

REF. NO.: CPO-2541

Mr. Morris G. Fox
2943 Kalakaua Avenue, #307
Honolulu, Hawaii 96815

Dear Mr. Fox:

Thank you for your letter dated July 17, 1979. Please accept our
apologies for not responding earlier to your concern regarding the weed
CLIDEMIA HIRTA and its relationship to the environment on the Ma Pali Coast.

To date no accepted, effective practices have been implemented to
prevent the transportation or introduction of the weed. Although the
cleaning of shoes, soles, and clothing of seeds and mud before entering
Clidemia free habitats is practiced by some hikers, the spread of this new
introduction to the state (Oahu, 1941) to outer islands - Hawaii (1972),
Molokai (1973), and Maui (1977) - demonstrates the capacity of the species
to spread.

Although we are unable to provide you with any "guarantee" of the
introduction of this weed into the area due to either helicopters, hunters
or hikers, a botanical survey was recently completed and we feel relatively
secure at this time in that the weed has not been recorded as occurring in
the Ma Pali region or elsewhere on the island of Kauai.

Our Division of State Parks is currently preparing the Draft
Environmental Impact Statement, and we expect to submit the document for
public review and comment by March, 1981.

Again we apologize for not responding sooner.

Very truly yours,

12/23/80:sgc:gd

SUSUMU ONO, Chairman
Board of Land and Natural Resources

cc: Division of State Parks

B. Responses to Draft Environmental Impact Statement

The following agencies, organizations and individuals reviewed and commented on the Draft Environmental Impact Statement. Those who made substantive comments concerning the proposed action received written responses to their concerns. They are indicated by an asterisk (*) in the following list. All of the letters received and the responses are reproduced on the following pages.

Federal Agencies

U. S. Department of Agriculture
U. S. Department of the Air Force
U. S. Department of the Army
*U. S. Army Engineer District
U. S. Fish and Wildlife Service
U. S. Department of the Navy

State Agencies

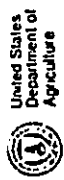
Department of Accounting and General Services
Department of Agriculture
Department of Defense
*Office of Environmental Quality Control
*Department of Health
Department of Planning and Economic Development
Department of Social Services and Housing
Department of Transportation
University of Hawaii at Manoa
 *Environmental Center
 *Hawaii Institute of Marine Biology
 *Water Resources Research Center

County Agencies

Department of Water

Organizations and Individuals

*David Boynton
*Morris G. Fox
*Helen C. Hopkins
*Life of the Land
*John Moriyama
*Professional Association of Pacific Archaeologist
The Sierra Club
 *Hawaii Chapter
 *Kauai Group



United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 50004
Honolulu, Hawaii
96850

May 7, 1981

Office of Environmental Quality Control
550 Halekaunila Street, Room 301
Honolulu, Hawaii 96813

Dear Sir:
Subject: Na Pali Coast Management Plan Draft EIS,
Na Pali Coast, Kauai
We have reviewed subject document and have no comments to make.
Thank you for the opportunity to review the document.

Sincerely,

Jack P. Kanvalz
JACK P. KANVALZ
State Conservationist

cc:
State Parks Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96852

REPLY TO: DEEV (Mr Shiroma, 449-1831) 27 MAY 1981
ATTN OF:

SUBJECT: Draft EIS, Na Pali Coast Management Plan
TO: Office of Environmental Quality Control
550 Halekaunila Street, Room 301
Honolulu, HI 96813

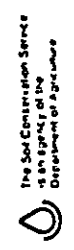
MAY 14 20 74 1981

1. This office has reviewed the subject EIS and has no comment to render relative to the proposed project.
2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.

William T. Morioka
WILLIAM T. MORIOKA
Chief, Engrg & Envtl Plng Div
Directorate of Civil Engineering

Cy to: State Parks Division
Department of Land and
Natural Resources
P. O. Box 621
Honolulu, HI 96809

2-30



The Soil Conservation Service
is an agency of the
Department of Agriculture

SCS-AS-1
10-79



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858

5 May 1961

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96858

APZY-51E-F

14 APR 1961

Mr. Harry Y. Akagi, Acting Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

RECEIVED
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
550 HALEKAUWILA STREET, ROOM 301
HONOLULU, HAWAII 96813
APR 13 11 03 AM '61

Dear Mr. Akagi:

Gentlemen:

The Ma Pali Coast Management Plan Draft Environmental Impact Statement (DEIS) has been reviewed and we have no comments to offer. There are no Army installations or activities in the vicinity of the proposed project.

The DEIS is returned in accordance with your request.

Sincerely,

Original signed by:

ADOLPH A. HIGHT
COL, EN
Director of Engineering and Housing

1 Incl
As stated

Copy Furnished:
State Parks Division
Department of Land and Natural
Resources
P.O. Box 621
Honolulu, Hawaii 96809

We have reviewed your Ma Pali Coast Management Plan Draft Environmental Impact Statement (DEIS) and have the following comments:

- a. There are no applicable Department of the Army permit requirements.
- b. Suggest adding to Recreation Management Objectives (III A(1)(c)) on page 24: "Prevention of the introduction of exotic stream life may be accomplished, in part, through public education programs, handouts on hazards to ecology, public health, water quality of exotics, fines for introducing animals, etc."
- c. Regarding aquatic surveys (bottom of page 31), once every five years is probably not sufficient to adequately monitor changes brought on by watershed disturbances, fishing and exotic species. We suggest surveys be conducted semi-annually or annually.
- d. General. Pit privies and other toilet facilities planned for isolated valleys should be located where accidental contamination of adjacent rivers/streams will be precluded.
- e. We have evaluated the Ma Pali coastal areas for potential flood hazards based on the Flood Insurance Study for the island of Kauai by the Federal Insurance Administration. According to the study, the Maana coastal area is situated within the tsunami inundation area (Zones V24, V30, and A6) where the 100-year tsunami elevation ranges from 10 to 36 feet above mean sea level. The 100-year event has a one percent chance of being equalled or exceeded in any given year. See the attached Flood Insurance Rate Map (Incl 1) prepared as part of the flood study. The Liwahuli Stream floodplain is located in the Maana area



SUSUMU CHOI, CHAIRMAN
 BOARD OF LAND & NATURAL RESOURCES
 1001 KALANIANA'OHU DRIVE
 HONOLULU, HAWAII 96813

GEORGE B. SHIMODA
 GOVERNOR OF HAWAII

STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 P. O. BOX 431
 HONOLULU, HAWAII 96809

6 May 1981

FODED-FV
 Mr. Harry Y. Akagi
 and is designated Zone A, or area of 100-year flood. All other areas within
 the Na Pali Coast State Park boundaries are in critical flooding areas designated
 Zone C.

Thank you for the opportunity to review this Draft EIS.

Sincerely,

(s)
 CLARENCE S. FUJII
 Acting Chief, Engineering Division

1 Incl
 As stated

CF:
 State Parks Division
 Department of Land and
 Natural Resources
 PO Box 621
 Honolulu, HI 96809

2 - 32

August 12, 1981

Mr. Clarence S. Fujii
 Department of the Army
 U. S. Army Engineer District, Honolulu
 Ft. Shafter, Hawaii 96858

Dear Mr. Fujii:

Thank you for your written response to the Na Pali Coast
 Management Plan Draft EIS.

Your suggested management objective has been included in
 the public information section (III, B, 5 page 30) and broadened
 to include the prevention of the introduction of plants and
 animals on land as well as in streams. We are also happy to
 report that aquatic surveys will now be conducted annually be-
 cause an aquatic biologist's position has recently been es-
 tablished for each of the main islands by our new Division of
 Aquatic Resources. Our existing pit privies are located away
 from streams at Milolii, Mualolo kai and Kalalau and as far away
 as feasible at Hanakapiai considering the physiography of the
 valley.

Thank you for the flood information. We have established a
 tsunami warning system with Kauai Civil Defense and include
 flood hazard warning in our public information program.

Very truly yours,

Susumu Choi
 SUSUMU CHOI
 Chairman of the Board



United States Department of the Interior

FISH AND WILDLIFE SERVICE
1000 ALOHA BOULEVARD
P.O. BOX 50187
HONOLULU, HAWAII 96810

IN REPLY REFER TO:
ES
Room 6307



HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOLYTO
PEARL HARBOR, HAWAII 96810

IN REPLY REFER TO:
002A:act
Ser 686

APR 16 10 30 AM '81

17 APR 1981

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Re: DEIS Na Pali Coast Management
Plan, Kauai County, Hawaii

Gentlemen:

We have reviewed the subject Draft Environmental Impact Statement (DEIS) dated March 1981, and offer the following comments.

The DEIS has adequately addressed probable impacts on the fish and wildlife resources of the Na Pali coast if the management plan is implemented. Due to the presence of the Koloa and Neveill's Shearwater in the project area, a formal consultation in accordance with Section 7 of the Endangered Species Act will be required if Federal funds should become involved in the project.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka
Ernest Kosaka
Project Leader for
Environmental Services

cc: HDE&C
Hawaii State Park Division (DLNR) ✓

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Na Pali Coast Management Plan
Draft Environmental Impact Statement

The Draft Environmental Impact Statement for the Na Pali Coast Management Plan has been reviewed and the Navy has no comments to offer. As requested, the subject EIS is returned.

Thank you for the opportunity to review the EIS.

Sincerely,

R. D. ERER
CAPTAIN, CSC, U.S. NAVY
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Encl

Copy to: (w/o encl)
✓ State Parks Division
Department of Land and Natural Resources



Save Energy and You Serve America!



GEORGE R. ARITOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 171, HONOLULU, HAWAII 96813

APR 10 1981

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Na Pali Coast Management Plan
Draft Environmental Impact Statement

We have reviewed the subject document and have determined that the proposed project will not have any adverse impact on any existing facilities serviced by our department.

Very truly yours,

Hideo Murakami
HIDEO MURAKAMI
State Comptroller



GEORGE R. ARITOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO KING STREET
HONOLULU, HAWAII 96814

LETTER NO. (P)1327.1

April 10, 1981

MEMORANDUM

To: Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Subject: EIS - Na Pali Coast Management Plan Draft EIS
TRK: 5-9 Na Pali Coast Kauai

The environmental impact statement has been reviewed by the Department of Agriculture, and we have no comments to offer.

We appreciate the opportunity to comment.

John Farias, Jr.
JOHN FARIAS, JR.
Chairman, Board of Agriculture

100 JUN 23 11 31 AM '81
STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
330 WALEMANA ST.
ROOM 301
HONOLULU, HAWAII 96813

HARRY Y. AKAGI
Acting Director
TELEPHONE NO
5434113

GEORGE R. ARTHUR
Governor

State of Hawaii
DEPARTMENT OF REVENUE
OFFICE OF THE AUDITOR GENERAL
3719 Diamond Head Road
Honolulu, Hawaii 96816

MEMO

MAY 7 1981

MEMORANDUM

May 7, 1981

TO: Susumu Ono, Chairman
Department of Land and Natural Resources

FROM: Harry Y. Akagi, Acting Director
Office of Environmental Quality Control

SUBJECT: Environmental Impact Statement for Na Pali Coast
Management Plan

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Na Pali Coast Management Plan Draft EIS

Thank you for providing us the opportunity to review your proposed project,
Na Pali Coast Management Plan Draft Environmental Impact Statement.

We have completed our review and have no comments to offer at this time.

Yours truly,

JERRY H. HAYSUDA
Captain, HANG
Contr & Regt Officer

cc: State Parks Division (DLNR)
Office of Env Quality Commission v/EIS

We have reviewed the subject statement and offer the following comments for your consideration:

GENERAL COMMENT

Although the EIS regulations do not prescribe a specific format for EIS's, we recommend that the appendices be summarized or included in the text of the EIS in order to logically support the conclusions on environmental impacts and the management plan. For example, the subject EIS states that rare and native plants and fauna are to be preserved, however little information is presented in the EIS regarding the species or the types of preservation being considered. The reviewer then finds some of this information in the appendices. Consequently, this format may lead to confusion and incomplete analysis of the EIS.

ENDANGERED SPECIES

The green sea turtle mentioned on page 25 is designated as a "threatened species" under the U.S. Endangered Species Act of 1973 and not an "endangered species" as indicated.

Page 48 should also indicate that the Newell's shearwater bird and Koloa duck are endangered species.

ALTERNATIVES

The EIS should expand the discussion on alternatives to

Susumu Ono
May 7, 1981
Page Two

include no action, elimination of helicopter landings, boat landings, or both.

POLICIES, PLANS, AND OBJECTIVES

The EIS should discuss the relationship of the proposed action to the Coastal Zone Management Act and the State Environmental Policy Act.

HELICOPTER USE

The most controversial activity included in the management plan is commercial helicopter landings. While we are aware that access to any other valley besides Kalalau is limited to only boats and helicopters, we suggest that the proposed sites of helicopter landings and rest stops be located in areas where the impact will be minimal.

The management plan does not seem to provide alternatives that deal with this controversial area, such as limiting the number of landings rather than focusing on the hours of landings. This alternative has the advantage of reducing the noise impact, having direct control, and preserving the wilderness experience.

The EIS should discuss the possible impacts on the area of the increased number of helicopter landings and rest stops. This construction will have adverse impacts and be incompatible with the concept of wilderness. How will the wilderness experience be preserved if the number of helicopter landings and rest stops increase? What controls will DLNR have if the number of landings increase?

For your convenience, we are listing the comments received on the subject document the attached sheet.

We thank you for the opportunity to review the subject statement. We look forward to the revised EIS.

Attachment

LIST OF COMMENTING PARTIES

FEDERAL

*Department of the Army April 14, 1981
*U. S. Fish and Wildlife Service April 16, 1981
*Naval Base Headquarters April 17, 1981

STATE

State Energy Office April 8, 1981
Department of Agriculture April 10, 1981
Department of Accounting and General Services April 10, 1981
Department of Social Services and Housing April 15, 1981
*Department of Defense April 21, 1981

COUNTY OF KAUAI

*Department of Water April 27, 1981
PRIVATE
*William K. Kikuchi April 26, 1981
John Moriyama April 27, 1981
*Helen Hopkins May 3, 1981

*comment previously forwarded by reviewer to DLNR

CLONCE R. JARVIS
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 121
HONOLULU, HAWAII 96813

August 12, 1981

SUSUMU OMO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HARRIS
DIRECTOR

DIVISIONS:
CONSERVATION AND ENFORCEMENT
PLANNING AND DEVELOPMENT
LAND USE
LAND MANAGEMENT
STATE PLANS
WILDLIFE AND LAND ENVIRONMENT

Mr. Harry Y. Akagi
Acting Director
Office of Environmental Quality Control
550 Halekauwila St., Room 301
Honolulu, HI 96813

Dear Mr. Akagi:

I want to thank you and your staff for the written comments and help in preparing the Na Pali Coast Management Plan Draft EIS.

In order to reduce the text for the plan and focus on management considerations, the detailed survey information was purposefully located in the appendices. Highlights and management implications from these surveys are given in the plan in Section II, C&D. At the beginning of each resource topic, and the visitor management section, we have now included a reference to the appropriate appendix.

Our wildlife staff indicates green sea turtles and Newell's shearwater are threatened species and only the Koloa duck is endangered. We have amended the EIS to reflect the protected status established by the U.S. Endangered Species Act.

We have added an introductory paragraph to the commercial access alternatives section of the EIS (page 2-10) indicating the complex mix of variables involved in dealing with two modes of access, various park units and different park visitor needs. Detailed consideration of all these alternatives in the environmental assessment would require a lengthy report repeating the management considerations already included in the plan. The government policies section has also been expanded to include the Coastal Zone Management Act and the State Environmental Policy Act.

Some commercial helicopter access alternatives are indicated in the environmental assessment but the plan itself reflects the Board of Land and Natural Resources decision on helicopter use. We do not believe that landings for campers are a serious problem. All campers must have a valid camping permit issued exclusively

Mr. Harry Y. Akagi
August 12, 1981
Page 2

by the State Parks Division and the number of campers allowed at one time is limited so landings are also limited. Landings for reststops are a problem, however. Unfortunately both the number of landings and the hours of landings are difficult to monitor and enforced along this isolated coast. If future revisions of the management plan include any significant park expansion, including increases in helicopter services, these revisions will include an environmental assessment and the consideration of a supplemental EIS statement.

We expect to submit the revised EIS to the Environmental Quality Commission in the near future.

Very truly yours,

SUSUMU OMO
Chairman of the Board

2. 37

GEORGE R. ARITOSH
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801
May 11, 1981

May 11 3 47 PM '81

GEORGE A. L. YUEN
DIRECTOR OF HEALTH
MARTY K. THOMPSON, M.D.
DEPUTY DIRECTOR OF HEALTH
MELVIN K. KOIZUMI
DEPUTY DIRECTOR OF HEALTH
ABELINA MADRID SHARP, M.A., J.D.
DEPUTY DIRECTOR OF HEALTH

IN REPLY, PLEASE REFER TO:
FILE: EPHIS-SS

MEMORANDUM

To: Administrator, State Parks Division
Department of Land & Natural Resources

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Na Pali Coast Management
Plan, Kauai

Thank you for allowing us to review and comment on the subject EIS.

Our Kauai District Health Office looks forward to working with your staff in the establishment of sound health standards for the operation and maintenance of your primitive backcountry facilities such as those in the Na Pali Coast.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Melvin K. Koizumi
MELVIN K. KOIZUMI

cc: OEQC
District Health Officer, Kauai

GEORGE R. ARITOSH
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 421
HONOLULU, HAWAII 96801
August 12, 1981

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR S. HANAUSS
DEPUTY TO THE CHAIRMAN
DIVISIONS:
CONSERVATION AND ENFORCEMENT
CONSERVATION
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Melvin K. Koizumi
State of Hawaii
Department of Health
P. O. Box 3378
Honolulu, HI 96801

Dear Mr. Koizumi:

Thank you for your written response to the Na Pali Management Plan Draft EIS.

Our Kauai Parks Supervisor was particularly pleased with the 1981 Health Department inspection report on our Na Pali Coast facilities. A combination of improved maintenance and a reduction in use during peak periods has apparently improved sanitation.

Your continued assistance in monitoring our program and developing appropriate health standards is greatly appreciated.

Very truly yours,

Susumu Ono
SUSUMU ONO
Chairman of the Board

2-30



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

Kapalua Bldg., 210 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2355, Honolulu, Hawaii 96824

GEORGE R. ARYOSHI
Comptroller
HIDEYO KONO
Director
FRANK SURIVANEK
Deputy Director

May 5, 1981

Ref. No. 3093

Mr. James Yamashiro
Administrator
State Parks Division
Department of Land and Natural
Resources
P.O. Box 621
Honolulu, Hawaii 96809

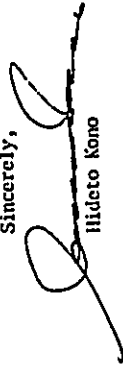
Dear Mr. Yamashiro:

Subject: Na Pali Coast Management Plan Draft Environmental
Impact Statement

We have reviewed the above document and find that it has adequately
identified the major environmental impacts which can be anticipated to result
from the proposed management plan.

Thank you for the opportunity to review this matter.

Sincerely,



Hideyo Kono

cc: Office of Environmental Quality Control



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
P. O. Box 339
Honolulu, Hawaii 96809
April 15, 1981

GEORGE R. ARYOSHI
COMPTROLLER

FRANKLIN Y. K. SUNN
ALFRED K. SUGA
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
RICHARD PAGLIANAWAN
DEPUTY DIRECTOR

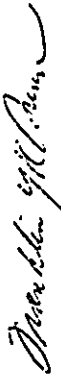
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Na Pali Coast Management Plan Draft EIS

Thank you for the opportunity to review the subject document.
We have no comments to make on the document. As you request,
we are returning the EIS.

Sincerely,



Franklin Y. K. Sunn
Director

GEORGE H. ARYOSH
DIRECTOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
WAIKIKI DRIVE
HONOLULU, HAWAII

May 14, 1981

RECEIVED
DIRECTOR

JACK SULLA
JAMES B. CERRAS
JAMES D. JACOBY
J. T. HARRIS

DIRECTOR
STP 8.7264

MEMORANDUM

TO: Mr. Harry Akagi, Acting Director
Office of Environmental Quality Control

FROM: Director of Transportation

SUBJECT: NA PALI COAST MANAGEMENT PLAN DRAFT EIS

Thank you for the opportunity to review the subject draft EIS.

We find the proposal not in conflict with any of our plans, facilities, or operations.

Robbie Higashimura
Robbie Higashimura



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

MAY 14 5 25 AM '81
STATE PARKS

Office of the Director

Mr. James J. Yamashiro
Administrator
Division of State Parks
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Yamashiro:

Draft Environmental Impact Statement
Na Pali Coast Management Plan
Na Pali Coast, Kauai

The Environmental Center has reviewed the Draft EIS for the Na Pali Coast Management Plan with the assistance of Charles Lamoureux, Botany; Bill Burke, General Science; Larry Olson, Archaeology; Jacquelin Miller, Alexis Cheong and Garret Kawamura, Environmental Center.

The Draft EIS is rich in data and presents a comprehensive analysis of the Na Pali Coast. The following comments are presented with respect to the way in which this information has been incorporated into the area's management plan.

Wildlife Management

We recognize that the feral goat population of the Na Pali Coast has decreased, perhaps by as much as 50 percent over the past 20 years. However, their numbers could still cause considerable change in the area's natural features. As noted in Appendix D, severe erosion along cliffs of Honouliuli Valley due to over-grazing has resulted in irreparable damage to the area's soil structure (p. 6). This study also cites that "considerable changes" in the vegetation of the Na Pali Coast have occurred since the last survey in 1972 (p. 6). These observations deserve much more consideration in the management plan.

The Draft EIS repeatedly states that goat populations should be maintained near the maximum numbers within the carrying capacities of the areas they graze (pp. 7 and 25). How are these grazing areas being defined and how are the carrying capacities determined? Appendix D notes that the distribution of the goat population is affected by helicopters, increased human activity and undesirable forage. It would seem that a program for monitoring the goat population should be conducted at least once a year. The fish and wildlife survey proposed in the management plan (every 5 years) stands the chance of overlooking significant changes in the goat population.

AN EQUAL OPPORTUNITY EMPLOYER

2-40

Mr. James J. Yamashiro

-2-

May 8, 1981

Have alternative plans been considered for managing the public hunting program in Kalalau Valley? To prohibit non-hunter access into the Valley on Saturdays and Sundays during the months of August and September would not be in the best interests of those who camp and hike in this area. Appendix A points out that the number of visitor nights during August 1979 exceeded those of all other months, while September's volume ranked fourth. Heavy visitor volume during these two months is also common for the other Na Pali Coast camp sites, many of which would be subject to the public hunting program. In order to maximize the use of these public areas and minimize the danger of mixing hunting and camping activities, the Na Pali Coast Management Plan should consider a more equitable hunter program.

Hazard Warning System

Pages 10-11, Appendix G of the Draft EIS document accurately points out a number of hazards associated with the Na Pali Coast region, primarily those related to tsunamis and severe storms. The study also states that "a tsunami warning system for this remote region is needed." The visitor use management sections of the park unit management plans make numerous references to these critical hazards. However, merely providing warning signs and printed materials to hikers and others who utilize the region (pp. 35, 38, 39, 42, 44, 46, and 48) will not be sufficient in times of emergency. Granted, warning signs posted at the head of trails will warn hikers of impending dangers but this does nothing to warn those who are already on the trails and perhaps camping on the beaches.

The Na Pali Coast needs an early-warning system to alert all those within the region of a potential tsunami or flash flood. In the case of a tsunami, the State Parks Division should coordinate their plans with State Civil Defense authorities to ensure that evacuation measures are provided for those located at isolated beaches along the Na Pali Coast. To what extent have such plans been formulated?

Archaeology

In order to determine the extent to which archaeological features are being damaged by park visitors, a monitoring program should be conducted annually until the effectiveness of the management plan can be confirmed. The archaeology section of the plan (p. 26) should be amended to recognize the danger of leaving valuable sites unmonitored for a period of 3 years.

Public Access

Are any trailhead improvements planned for the Na Pali Coast? In light of the number of hikers planned for this area, it seems that trailhead facilities in the form of parking areas, telephones and coinfort stations may be justified.

The above comments represent the basic concerns raised by our reviewers as to the adequacy of the document to describe the potential environmental impacts which may be expected to result from the initiation of the proposed management plan.

We wish, however, to take this opportunity to express our concern and serious reservations regarding one major key resource objective: "Goat populations should be kept near maximum numbers which are compatible with the safe carrying capacity of their habitat and public hunting purposes." There are innumerable examples of severe damage to all types of vegetation

Mr. James J. Yamashiro

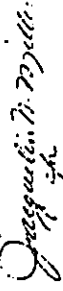
-3-

May 8, 1981

and an increase in soil loss/erosion problems due to grazing by goats. Islands throughout the Pacific have suffered irreparable damage directly attributable to the introduction of goats. Their adverse effects have been recognized at the national level in park management programs of the U.S. National Park Service and at the state level in virtually every other state in the United States. The inclusion of a provision in the Na Pali Coast Management Plan to support, as an objective, the continuance of the goat population is without ecological, or environmental justification.

We would hope that the information now available in this DEIS will be put to the use for which the EIS system was intended, namely to provide the necessary information upon which to base wise decision making. The continued existence of goats in the Na Pali area should be deleted from the management objectives and every effort should be made to eradicate goats from this area.

Sincerely



Jacquelin M. Miller
Diane C. Drigot, Ph.D.
Acting Director

KMK

cc: OEQC
Charles Lamoureux
Bill Burke
Larry Olson
Jacquelin Miller
Alexis Cheong Linder
Garret Kawamura

GEORGE B. ARBONCH
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 527
HONOLULU, HAWAII 96822

SUSUMU ORO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. MAUSU

DEPUTY TO THE CHAIRMAN

DIVISIONS:

CONSERVATION AND RECREATION

CONSERVATION

FOREST AND GAME

LAND MANAGEMENT

STATE PARKS

WATER AND LAND DEVELOPMENT

August 12, 1981

Ms. Diane C. Drigot, Ph.D.
August 12, 1981
Page 2

Ms. Diane C. Drigot, Ph.D.
Acting Director
University of Hawaii at Manoa
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Dear Ms. Drigot:

Thank you for the comprehensive review of the Na Pali Coast Management Plan Draft EIS.

We note your particular concern with the existing goat population and have reviewed this with our wildlife staff. The "considerable changes" in the vegetation, since 1972 reflect the general spread of exotic plants. While many visitors refer to the pristine condition of the Na Pali Coast, it should be remembered that the present landscape actually represents the end product of a long history of settlement beginning as early as the 11th century and ending as late as the mid-20th century when the last commercial cattle operation was closed in Kalalau Valley. Given this perspective and the relative isolation of the area, it is understandable that a fairly rapid succession of vegetation will occur until a more stable climax ecosystem of exotic and native species is established. Goats have obviously been part of this change for many years, but providing overgrazing is controlled no other significant, long term negative environmental impacts have been identified. The severe erosion along the Honopu Cliffs occurred when goat populations were considerably higher than they are now.

While the management plan and wildlife survey indicate monitoring surveys should be made every five years, this recommendation refers to the detailed ground survey similar to the survey found in Appendix D. To some extent goat populations are being monitored constantly by the public, staff members and by hunters during annual hunting seasons. Aerial surveys have also been taken as indicated in Table 4, Appendix D. Since carrying capacities can vary from year to year because of such variables as weather and hunting success, the carrying capacities have not been quantified.


The conflict between goat hunting and the general heavy volume of visitors in August and September has been identified on Page 29 of the plan. Alternative plans have been considered but at present, we have no data or clear understanding of the hunting activity and hunter needs. Therefore, in drafting the subject plan, we were reluctant to make changes but adjustment to the hunting season are desired if a feasible change can be arranged. We continue to believe the best way to deal with any goat problem on the Na Pali Coast is to maintain a goat population compatible with the environment and control this population through a public recreational hunting program. In areas where the preservation of native ecosystems is a primary consideration such as in some national parks, we would agree that goat eradication may be necessary unless fenced enclosures are feasible.

A hazard warning system has been established with the Kauai Civil Defense. If a tsunami hazard exists, Civil Defense will send helicopters with loud speakers along the Na Pali Coast. This warning system is an operation 24 hours a day.

Our staff archaeologist and the consultant for the reconnaissance survey concurred that sites only need to be monitored every 3 years. This was based on the assumption that public use would not be increased and no expansion of intensive use areas would occur. It should also be realized that the existing intensively used areas have been continuously used by the public for many years so the impact of present use is not expected to add significantly to site damage that has already occurred. The archaeological sites from Hanakapiai to Katalau were monitored in July, 1981 by staff archaeologist while doing some additional work and no significant changes were noted.

Your continued interest into this project and other environmental projects is greatly appreciated.

Very truly yours,


SUSUMU ORO
Chairman of the Board

University of Hawaii at Manoa



Hawaii Institute of Marine Biology
P.O. Box 1340 • Coconut Island • Kaneohe, Hawaii 96741
Cable Address: UNHIAIW
May 19, 1981

Mr. James J. Yamashiro
State Parks Administrator
Division of State Parks
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Yamashiro:

Recently I had the opportunity to read the Draft EIS for the Ma Pali Coast Management Plan dated March 1981. I was surprised to learn that the constructive suggestions relating to green sea turtles that I had made in my letter of August 29, 1980 were not incorporated into the document. Furthermore, there was no indication that I had even submitted these comments to your office for consideration.

I do not know what factors were involved in this matter, but I would appreciate being informed of the specifics. Copies of our earlier correspondence have been enclosed for reference purposes.

Sincerely,
George H. Balazs

George H. Balazs
Assistant Marine Biologist

cc
Office of Environmental Quality Control
UH Environmental Center

GHB:tb

AN EQUAL OPPORTUNITY EMPLOYER



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 677
HONOLULU, HAWAII 96799

August 24, 1981

Mr. George H. Balazs
Assistant Marine Biologist
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P. O. Box 1346
Honolulu, Hawaii 96744

Dear Mr. Balazs:

Thank you for your written response to the Ma Pali Coast Management Plan Draft EIS. All responses to the EIS were delayed until the revised draft was completed in August.

Your suggestions of August 29, 1980 were received and considered together with other correspondence from you over the past year. We would like to do a number of more detailed or more extensive resource surveys and take advantage of many public interpretive opportunities, but this work must be prioritized. Priority has been given to managing those geographic areas and resources which are most likely to be significantly impacted by people. The information on green sea turtles and its management are included in page 25 of our plan. Some informational handouts are being planned and we can mention the need to protect threatened and endangered plant and animal species at that time. In the meantime, we would be glad to distribute any information you or others could provide.

Your continued interest in the Ma Pali Coast is greatly appreciated.

Very truly yours,

Susumu Oso
SUSUMU OSO
Chairman of the Board

SHIRAKI AND ASSOCIATES
CONSULTANTS
PLANNING AND DEVELOPMENT
1001 KALANIANA'OLANI BLVD., SUITE 1100
HONOLULU, HAWAII 96813
TELEPHONE: 533-1111
FAX: 533-1111

12 12 1981



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

14 May 1981



STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 421
HONOLULU, HAWAII 96809

August 12, 1981

GEORGE R. ANIYOSHI
GOVERNOR OF HAWAII

SUSUKU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
FOURTH FLOOR
EIGHTH FLOOR
DIVISIONS:
CONSERVATION AND ENFORCEMENT
PLANNING
FISH AND GAME
LAND MANAGEMENT
WATER RESOURCES
WILDLIFE AND LAND DEVELOPMENT

Mr. Edwin T. Murabayashi
EIS Coordinator
University of Hawaii at Manoa
Water Resources Research Center
Holmes Hall 283, 2540 Dole St.
Honolulu, HI 96822

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Na Pali Coast Management Plan Draft EIS

We have reviewed the subject DEIS and have no comment to offer specifically regarding the environmental impact. We do wonder, though, about provisions for visitor's security and emergency assistance in case of accidents, etc.

This material was reviewed by NRRRC and affiliate personnel. Thank you for the opportunity to comment.

Sincerely,
Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

ETH:jm

cc: Y.S. Fok
H. Gee
C. Liu
State Parks Division

2-44

Dear Mr. Murabayashi:

Thank you for your written response to the Na Pali Coast Management Plan Draft EIS.

Provision for park visitors security is limited to the Division of Conservation and Resource Enforcement officers patrols and State Park caretaker checks. To date, security has not been a serious problem on the Na Pali Coast except for thefts involving cars left at Hanalei.

A 24 hour emergency warning system has been established with the Kauai Civil Defense for tsunamis. However, in the case of emergencies which occur within the park, there are no means of communication for assistance. During the day, passing helicopters have been very cooperative in checking for emergencies. Emergency radio communication is being considered, but emergency assistance should not be expected as part of a wilderness experience.

Your interest is greatly appreciated.

Very truly yours,

Susuku Ono
SUSUKU ONO
Chairman of the Board

DEPARTMENT OF WATER

COUNTY OF KAUAI
P. O. BOX 1708
LIHUE, HAWAII 96766

April 27, 1981

Office of Environmental
Quality Control
550 Halekaunila Street
Room 301
Honolulu, Hawaii 96813

Re: Na Pali Coast Management Plan Draft EIS
We have no comments to offer on this Draft EIS.

Thank you for checking with us.

Raymond H. Sato
Raymond H. Sato
Manager and Chief Engineer

WH:at

cc: State Parks Division ✓
Dept. of Land & Natural Resources

2-45

From: David Boynton
Box 651
Waimea HI 96795
May 10 1981

Department of Land and Natural Resources

Dear People:

I am writing in reference to the Na Pali Coast Management Plan. These comments are probably being submitted past the deadline, but I hope you will take them into consideration, considering that I requested in writing to be notified of the public input opportunities (See page 2-23). So again, I request, if there are additional future opportunities for comment on any aspect of the Na Pali Coast Plan, Park, C.I.S. or whatever... please notify me.

In response to my letter, specifically about the issue of restricting helicopter flights over. I disagree with your position that "jurisdictional and associated enforcement problems" are reason for not restricting helicopter flight paths over state parks and hiking trails. First, you do not have the legal right to regulate those flights, but you have created a give-and-take agreement by allowing these helicopters to make commercial landings on conservation-zoned land. In exchange for allowing commercial landings, you can work out an agreement to restrict flight paths and elevations; indeed, you do that for the Na Pali trail and Kalalau Valley landing area. That type of flight restriction should be extended over areas such as Pukea State Park. Another alternative is to ask the F.A.A. to create such restrictions. In their view, the F.A.A. has recognized the environmental reasons for restricting overflights of wilderness areas... evidently, there is a letter to the solicitors office of the Interior Department to that effect. Also, there is an executive order barring overflights of the Houdary Waters Canon Area. Unfortunately, the currently anti-environmentalist, anti-regulatory Reagan/DeWalt administration may cause difficulties. However, Reagan is a strong believer in States rights, and if the State surmounts this

Issue vigorously, there is reason to expect a receptive hearing. This area of the Na Pali Coast / Waimea Canyon / Kokee State Park is truly one of the most beautiful and scenic areas anywhere in the country... yet it's wilderness character is being shattered by the dozens of helicopter flights... an airborne freeway through the best parts of the wilderness. Jack Harter conducts relatively unobtrusive flights... why not request his assistance and suggestions concerning flight path regulation.

Also, as to the matter of rest-stops... Again, I feel that rest stops at such places as Milolii are a total farce and totally unnecessary. I felt that when I took my helicopter tour a few years back, those minutes on the ground were wasted minutes... time that I would have much preferred taking it all in from the air. By allowing camper dropoffs and reststops at Milolii from 8 a.m. till 5:00 p.m., you create the specter of continuous helicopter presence in Milolii during the daytime hours. The helicopter companies have the capacity for 60 flights per day, which is more than enough to fill every minute of that time period with landed helicopters. (Only 36 flights per day, if each takes a Milolii reststop, could create that continuous presence.)

Also, concerning my comments about goats: you say on 2-24 that the DLR "did not identify any existing areas where goats were impacting our n. iv. ecosystem". However, on pg C-20, mention is made of goats eating Ulaecharita subulnata, one of the "notable plants" listed on pg C-16. Provisions for control of excessive goats, especially in the area of Hanalei, Hanalei, and Hanalei are needed. This can easily be done by DLR employees.

The last comment... a much more extensive botanical survey is needed... Ulaecharita subulnata, a very rare plant, is mentioned on C-17 as occurring on the cliff below the trail... true, but there are several others on the cliff above the trail. This is just one example of the need for improved botanical data.

GEORGE A. BOYNTON
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 141
HONOLULU, HAWAII 96810

SHIRLEY O'NEIL, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES
LEOLA A. HANAUSS
DIRECTOR OF TOURISM
DIVISIONS:
CONSERVATION AND RECREATION
LAND AND WATER
PLANNING AND DEVELOPMENT
WATER AND LAND DEVELOPMENT

August 24, 1981

Mr. David Boynton
P. O. Box 651
Waimea, Hawaii 96796

Dear Mr. Boynton:

Your comments are welcomed regardless of the submission deadlines for the Na Pali Coast Management Plan Draft EIS. According to Environmental Quality Commission records a copy of this document was sent to you, but returned by the Post Office because they had no forwarding address.

Although our jurisdiction over helicopter flights is limited to landings on lands which we manage, our right of entry agreements for helicopter companies indicated landing patterns and stipulated that scenic flights along the Na Pali Coast be flown at not less than 1000 feet elevation above sea level and well away from camping areas and trails except for purposes of park maintenance or emergencies. As you may know, these right of entry agreements established with two of the helicopter companies were cancelled by the Board of Land and Natural Resources effective June 1, 1981 for non compliance.

We are aware of the overflight restriction of the Boundary Waters Canoe Area, but these are the only restrictions we know of in the nation. Adequate enforcement is essential to implementing restrictions and until we have some assurance that overflight restrictions for Kauai's scenic areas can be enforced, we are reluctant to establish regulations.

The helicopter reststop problem at Milolii has been recognized by my staff and we are reviewing the need for reststops and alternative locations for them.

2943 Kalakaua Avenue, #307
Honolulu, Hawaii 96815
May 6, 1981

Mr. David Boynton
August 24, 1981
Page 2

The Honorable George Ariyoshi
Governor
State Capitol
Honolulu, Hawaii 96813

Re: Ma Pali Management Plan - Draft EIS

Dear Governor Ariyoshi:

In accordance with instructions of the State's Environmental Quality Commission, I am forwarding my comments on the draft EIS to you, the Accepting Authority.

The draft EIS outlines a plan which will help protect this unique, irreplaceable natural resource. However, it does not provide the protection needed to adequately preserve this area for future generations. It appears that those who have drafted the EIS have yielded to the pressures of commercial interests who put their personal profits above the long range protection of this public resource.

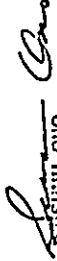
The EIS appears to be based on a shortsighted policy that it is more important to provide access to persons who are not seeking a wilderness experience than to preserve what is left of what was once an unspoiled area. Entry of aircraft and motorized boats should be limited to those necessary for the business of surveillance, scientific investigation and emergencies. Commercial aircraft should be kept out of the air space above the land. Thus, only those able to hike in or to paddle in would be allowed entry for other than the above reasons and these should be limited and required to observe measures to prevent the introduction of enemy plants such as the weed *clidemia hirta*. Sightseers can continue to enjoy the visual beauties of the Ma Pali Coast and its valleys from offshore either by air or by sea.

Mr. Governor, I hope you can use the authority of your office to see that the resources of the Ma Pali Coast are more adequately protected for future generations by limiting overflights or entry by planes and helicopters, as well as landing from motorized

A number of more detailed or more extensive resource surveys are desired, but this work must be prioritized because of manpower and funding constraints. Priority has been given to those geographic areas and resources, which are most likely to be impacted by people. Since people are not likely to impact cliff areas or isolated valleys where most native, rare plants are located, botanical surveys have not been given a high priority. The botanical survey recommendations on page C-22, state that goats impact on native plants should be carefully monitored and controlled by public hunting. Our surveys indicated goats are not making extensive impacts on our native ecosystems. Local browsing on *lipochaeta succulenta* is not expected to have a significant impact on the existence of this plant.

Your continued interest in the Ma Pali Coast is greatly appreciated.

Very truly yours,


SUSUMU OHO
Chairman of the Board

2-47



GEORGE B. BRINTON
GOVERNOR OF HAWAII

SUSUNU OMO, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES
1008 K. WILUKU
DRAFTING OFFICE

DIVISION
CONSERVATION AND ENVIRONMENT
LAND AND NATURAL RESOURCES
ADMINISTRATION
PLANNING
LAND MANAGEMENT
RECREATION
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 57
HONOLULU, HAWAII 96815

August 12, 1981

The Honorable George Ariyoshi
May 6, 1981
Page 2

waterborne crafts, to those on official business only. Such amendments to the Na Pali Management Plan will reduce both the cost of the state management and the damage to the environment.

It is true that such restrictions will have an adverse economic impact on a handful of people, but such measures will protect an irreplaceable resource for future generations and are therefore fully justified.

Sincerely,

M. G. Fox
Morris G. Fox

MGF:5yo

cc: Office of Environmental Quality Control
State Parks Division, Department of Land and Natural Resources

Mr. Morris G. Fox
2943 Kalakaua Ave., #307
Honolulu, HI 96815

Dear Mr. Fox:

As Chairman of the proposing agency, I am responding to your comments on the Na Pali Coast Management Plan Draft EIS.

The main purpose of the Na Pali Coast Management Plan is limited to developing an adequate system for managing the traditional type of public use and the geographic areas where this use has been focused for many years. Part of this management system involves establishing baseline studies and monitoring and the existing use and the existing condition of the natural and cultural features of the Coast. We are reluctant to recommend changes in use, except to control numbers of users, or changes in resource management without first understanding the existing situation and the likely impact of any recommended change.

The number of visitors has been substantially reduced during the peak summer use periods, particularly at Kalalau, by limiting the number of camping permits being issued and enforcing this permit system. Commercial boat and helicopter landing have also been limited to a few designated sites but unfortunately the State has no direct control over helicopter flight paths. Thus we feel the environment is receiving more protection than it has in the past and the visitors experience has been improved. More can certainly be done however, and as we continue to learn about the needs of the visitor and the environment, we expect our management to improve.

Your continued interest in this project will be appreciated.

Very truly yours,

Susunu Omo
SUSUNU OMO
Chairman of the Board

2-48

May 3, 1981

State of Hawai'i
Environmental Quality Commission
550 Halekauwila St.
Room 301
Honolulu, Hawai'i 96813

Subject: Na Pali Coast Management Plan Draft EIS

The figures in the "Visitor Kail Survey", (chart pg. a-16) show that a large majority of those who went into the Na Pali Coast found the most objectionable aspects were cramped ground maintenance and helicopter access. Pg. 12 says: "...a significant number of the 1979 summer visitors found the inflatable boat service a convenient way to return to the North Shore area, and the physical condition of some hikers make the return trip by trail inadvisable".

People who are experienced in wilderness outings do not leave messy campsites nor do they expect to be transported out unless there is a bonafide emergency. Too many people go in who are not capable and physically fit. Everyone who applies for a permit to go in to Na Pali Coast should be warned that it is a difficult hike and they should not go in unless they are sure they can come out on their own. This would cut down on the necessity for pick-ups by boats and helicopters, which would make it a better experience for those who are capable of hiking in and out. It might also cut down on the number of people who get hurt or drown.

Not all tourists come to Hawai'i to sunbath on crowded beaches or spend their time at luxurious hotel/nightclub complexes where everything is within easy reach. The Na Pali Coast is not in the category of a Waikiki, Poipu or Lahaina-- it is a very special, very fragile place, as we all know. Some places must be left not only for the traveler who appreciates the unique and is capable of seeing it without sophisticated modern conveniences, but especially for the local people of Hawai'i to enjoy and preserve as part of their heritage. Tourism is an important industry to the State but tourists will not stop coming to Kaula'i because they are not allowed to trample the endangered flora, bother the rare birds or be picked up and dropped off at their whim or that of a helicopter pilot.

The on-going loss of things that are special to Hawai'i and its people, and the seeming disregard of their concerns is having severe sociological effects that are negating the

the attempts of the tourist industry and the State to maintain that industry.

On Pg. 14 of the EIS it is stated: ".....the Na Pali Coast is also a halfway point in the tour and the three existing helicopter companies all feel there is a need for passengers to stretch their legs and get away from noise and vibration of the helicopter for 10-15 minutes" (Underlining added.) There are now four helicopter companies flying along, and or landing on Na Pali Coast as follows:

JACK HARTER HELICOPTERS: 4 flights a day around the island starting every hour at 8:20 a.m. (one and a half hour flights). The four-passenger machines fly, among other places, along Na Pali, making one rest stop.

ISLAND HELICOPTERS: 8 "Grand Tours" a day starting every hour, beginning at 8:20 a.m., flying over Waimea, Na Pali, Hanalei, Waialeale, etc.

KEWAI HELICOPTERS: 3 machines, 3 different tours including beach drops with 10 to 15 flights a day. Drop-offs and pick-ups are at Miloli'i and Kalalau 4 to 6 times a day from 8:00 a.m. to 3:00 p.m.

PAPILLOH HELICOPTERS: 5 machines (4, 5 and 6 passenger) with seven different tours daily and an average of 20 trips a day. Included are: "Remote Kaula'i, a special day-long exploration of Kalalau Valley"; a flight that leaves from and flies over Princeville, Hanalei Bay, along Na Pali Coast, Waialeale, Waialeale and includes a drop off for the day on the beach on Na Pali Coast; dropoffs and pick-ups for campers at Kalalau and Miloli'i (a minimum of four people) from 8:00 a.m. to 5:30 p.m.; half hour tours (no stops); tours with one wilderness stop; a tour with two wilderness stops; a "gunset" tour with a stop at Miloli'i; a tour of the island with a stop off at a tourist area for lunch or breakfast.

Potentially there could be more than 60 flights a day to or over Na Pali Coast between 8:00 a.m. and 5:30 p.m.---a time span of nine and a half hours. This could add up to a flight every five minutes with constant overflights, drop-offs, pick-ups and rest stops on the coast. Who is concerned about giving the people on the ground under these flights a rest from the noise?

On Pg. 2-7 of the EIS the figures given on noise readings for helicopters based on by-passes, landings and take-offs are not realistic. Para. b on Pg. 2-8 says, in regard to helicopter hovering: "This situation occurs only briefly in the Na Pali area, usually when the helicopter pilots approach waterfalls at the head of the valleys to afford passengers a better

look at them. At other times, helicopters do not linger over any particular area."

Unfortunately this is not so. Some of the pilots hover over areas of special interest or when passengers want to take pictures. I have seen this many times, including hovering over occupied homes. Helicopters are, according to the State Department of Transportation, Airports Division, the noisiest of flying craft during climb-out and approach, and it is, of course true during hovering, which other planes do not do.

Attached is a copy of a news item from the Garden Island which points out that some of the helicopter pilots not only do things that are very dangerous, but that are also a form of harassment of people under their flights, not to mention our endangered wildlife. The FAA will not do anything about this unless they are given the name of the helicopter company and the number of the craft. This information is hard to obtain without binoculars, even when they are hovering because there is always a certain amount of movement with a helicopter.

The preparers of the EIS ask (pg. 2-11, Para. VIII, summary of Unresolved Issues): "Should commercial helicopters and tour boats be allowed to land on Na Pali Coast?", and go on to say that because Miloli'i, Nualolo Kai and the valleys between Miloli'i and Kalalau cannot be reached by trail or other overland access, they believe commercial access is essential. Is it really essential that each of these areas be opened to commercial use for tourism? If there are particularly valuable and vulnerable archaeological, wild life or botanical areas that would be threatened by opening them up to everyone, shouldn't they be set aside for preservation, study and exploration by students and instructors. So many species have been lost to Hawai'i. How many more will have to go before we understand how important they are to our world?

All of Na Pali can be seen from the air and pilots should be restricted from hovering over campsites and bird nesting areas, and from "spooking" the goats during hunting season. If helicopters and boats are going to be allowed to continue to land on Na Pali Coast, they should be restricted from going to the most ecologically fragile areas except for official groups. The number of landings for drop-offs and pick-ups should be restricted and there should be controls on the number of people who are allowed to camp and hike in such areas also. A quota system should be set up for Hawai'i residents so they have the same opportunities to go into Na Pali Coast to hike, camp or hunt, as the tourists do.

If one of the helicopter companies can operate profitably with four flights a day, why is it necessary for the others to have so many and so many different kinds of flights? The number of

daily flights should be restricted too.

HA'EHA There seems to be no plan for Ha'ena at present. Because it will be affected by the plans for Na Pali Coast, Ha'ena should be considered as part of the overall plan for Na Pali. The EIS mentions Lohi'au's Dancing Platform and "House" (a very important halau), the Ka ula a Paea He iau and other archaeological sites and speaks of trailhead facilities at Ha'ena for the Na Pali area.

Ke'e Beach has been discovered by the tourists, and many more Kaua'i people, who no longer go to the beaches taken over by tourist resorts, go there. With the increasing number of people going into the Na Pali area, it has become almost impossible for people on the North Shore to enjoy the beach at Ke'e because of lack of parking space. How can part of Ha'ena be taken over for trailhead facilities for Na Pali Coast without being included in the impact statement? There will surely be a conflict of interest here.

The EIS brings up the idea of busing for tourists to Ha'ena and mentions that the bridges at Hanalei will be widened. The bridges at Waiohi, Waipa, Waikoko, Wainiha #1, 2 and 3 will eventually be widened. However, Kanca Stream ford and Limahuli Stream crossing will be left as is. The Hanalei Bridge will be strengthened, not widened. Large buses cannot cross the bridge now and will not cross it after restoration. Any plan for busing tourists to Ha'ena will have to take this into consideration.

A plan for Na Pali and Ha'ena should be worked out that is best for the people of Hawai'i and for visitors who want to have a real wilderness experience. It should not be turned over to a few who see it merely as a place to be exploited.

Sincerely,

Helen C. Hopkins

Helen C. Hopkins
P. O. Box 266
Hanalei, Hawai'i 96714

cc to State Parks Division
Life of the land

CORRECTION

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

•seno/noliw

May 3, 1981

State of Hawai'i
Environmental Quality Commission
550 Halekauwila St.
Room 301
Honolulu, Hawai'i 96813

Subject: Na Pali Coast Management Plan Draft EIS

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daily flights should be restricted too.

HA'EHA There seems to be no plan for Ha'ena at present. Because it will be affected by the plans for Na Pali Coast, Ha'ena should be considered as part of the overall plan for Na Pali. The EIS mentions Lohi'au's Dancing Platform and "House" (a very important halau), the Ka ula a Paoa He'iau and other archaeological sites and speaks of trailhead facilities at Ha'ena for the Na Pali area.

Ke'e Beach has been discovered by the tourists, and many more Kaua'i people, who no longer go to the beaches taken over by tourist resorts, go there. With the increasing number of people going into the Na Pali area, it has become almost impossible for people on the North Shore to enjoy the beach at Ke'e because of lack of parking space. How can part of Ha'ena be taken over for trailhead facilities for Na Pali Coast without being included in the impact statement? There will surely be a conflict of interest here.

The EIS brings up the idea of busing for tourists to Ha'ena and mentions that the bridges at Hanalei will be widened. The bridges at Vaioli, Waipa, Waikoko, Vainiha #1, 2 and 3 will eventually be widened. However, Kanoo Stream ford and Limahuli Stream crossing will be left as is. The Hanalei Bridge will be strengthened, not widened. Large buses cannot cross the bridge now and will not cross it after restoration. Any plan for busing tourists to Ha'ena will have to take this into consideration.

A plan for Na Pali and Ha'ena should be worked out that is best for the people of Hawai'i and for visitors who want to have a real wilderness experience. It should not be turned over to a few who see it merely as a place to be exploited.

Sincerely,

Helen C. Hopkins

Helen C. Hopkins
P. O. Box 266
Hanalei, Hawai'i 96714

cc to State Parks Division
Life of the land

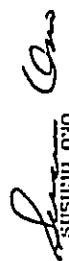
Ms. Helen C. Hopkins
August 24, 1981
Page 2

The Na Pali Coast Management Plan's main objective is to preserve natural and cultural resources with a minimum of human impact while providing visitors with a wilderness experience. From this Management point of view, Haena's road access and natural and cultural resource opportunities dictate different management objectives involving more intensive water recreation use and interpretive programs related to its rich archaeological features. Before any master planning can begin at Haena, however, a great deal of archaeological research will have to be made to identify archaeological features and potential interpretive opportunities. Once this is done, facility planning can begin, including trail head facilities for the Na Pali Coast.

There are no plans for busing tourists to Haena. Some visitor mail survey responses identified a parking security problem at Haena and suggested that a shuttle bus be provided but we have not acted on this idea. Currently, there is a trend to use vans rather than large buses for guided tours which would make tourist access to haena more feasible.

Your continued interest in this project will be appreciated.

Very truly yours,


SUSUO OHO
Chairman of the Board

Steve Levine
Life of The Land
250 South Hotel Street
Room 211
Honolulu, Hawaii
96813

Office of Environmental Quality Control
350 Halekauwila Street
Room 301
Honolulu, Hawaii
96813

7 May 1981

Dear Sir or Madam,

Re: Na Pali Coast, Kauai
Management Plan, Draft EIS Review

The New Na Pali Coast Management Plan cannot be characterized as anything more than an interim plan. What this Plan does is simply pinpoint unresolved areas, supplying little information of quantitative or qualitative nature. Although the impacts of current usage are not clearly understood, the E. I. S. discusses the need to consider opening up heretofore inaccessible areas and expanding facilities (page one).

The E. I. S. lists three management components, with resource management being first (page two). It seems that some archaeological survey work has been done, (page six) but an organized baseline of data needs to be gathered immediately. Since there are many places of archaeological value that people can visit (page seven), it is not clear what impact current or expanded use at any location will have. The Department, lacking sufficient knowledge, is taking barefaced risk that important sites will survive during the time in which adequate analysis can be accomplished.

According to the plan, with regards to freshwater biota, the harvesting of fish "may" need to be eliminated (page 9). There is no data indicating either what constitutes a depletion problem or the current status of the freshwater habitats. The elimination of harvesting is a management option only, and useless until it becomes a part of an integral body of coherent information and an efficient monitoring program.

The same holds true for native species of flora. While recognizing that they do exist within the Na Pali Coast Management area (page six), no baseline data has been gathered and the acquisition of such an informational base is deemed

Na Pali Coast

7 May 1981

Page Two

low priority because of the proliferation of exotic species. Without this information, any claims of managing use to protect native species is a sham.

The Management Plan states the presence of some native species of birds and amphibians (page seven). No efforts are made to recount species and sightings within the management area (except at page 46). The impact of visitor use upon these resources is not addressed nor is the issue of mitigating potential effects. A management policy is set concerning the hunting of goat within the area (page seven). The plan proposes to keep them at the maximum carrying capacity, yet no quantification is included - the effect of this population level on the Na Pali Coast is, therefore, impossible to assess.

It is stated that hikers will be given priority over boat and helicopter users (page 29). Left unclear is what will happen when hiker demands exceeds available "hiker" permits. Will unused or unreserved helicopter and/or zodiac-permits be shifted to "hikers"?

There are some questions to be asked concerning the logic used to support expanded use of Nualolo Kai. The comparison to Hanalei Bay is spurious. Hanalei Bay has excellent access and protective status for the marine environment. To state that increased use on Oahu, where the tourist population is much larger, translates to an increased interest in snorkelling at Nualolo Kai is spurious.

This E. I. S. is wholly inadequate to provide a meaningful framework for public input on the proposed uses of the Na Pali Coast. As constituted, the current plan is fraught with acknowledged but unquantified risks. The DNR should in no way be permitted to blindly gamble the precious resources of the unique and rare Na Pali Coast of Kauai.

Respectfully yours,

Calley O'Neill
Calley O'Neill for Steve Levine
Life of the Land

SL: co'n

GEORGE R. ARNOCKI
DIRECTOR OF DNR



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P O BOX 417
HONOLULU, HAWAII 96813

August 24, 1981

Mr. Steve Levine
Life of The Land
250 South Hotel Street
Room 211
Honolulu, Hawaii 96813

Dear Mr. Levine:

Thank you for your written response to the Na Pali Coast Management Plan Draft EIS.

While the management plan identifies a need to consider expanding park facilities to inaccessible areas, this need is to be addressed in future planning and is not part of this management plan. The main purpose of the management plan is limited to developing an adequate system for managing the traditional types of public use and the geographic areas where this use has been concentrated for many years. Resource surveys would have to be undertaken before opening new areas for more intensive use.

The freshwater biota information on page 8 and 9 attempts to highlight the Freshwater Survey Report found in Appendix F. Since an aquatic biologist has recently been assigned to the island of Kauai by the Division of Aquatic Resources, we will now establish an annual monitoring program. Unfortunately, we do not have adequate personnel for extensive, detailed botanical surveys but areas of high public use have been surveyed (see Appendix C) and found to contain few native species. The data for the wildlife section on page 7 is contained in Appendix D. Quantifying the goat carrying capacity was not included because it is difficult to quantify and would vary from year to year because of such variables as the weather and hunting success. The Final EIS has been amended to refer the reader to the appendices for further details on the Resources Management and Visitors Use Management sections.

We do not issue hiking permits, only camping or day-use permits. Day hikers going to Hanakapiai Beach and Hanakapiai Valley are not required to have day use permits although such a permit system may be established if warranted by increased use. The trail beyond Hanakapiai requires more hiking experience and day use permits are required but currently, because of low demand, no maximum has been established.

April 27, 1981

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Sir:

Mr. Steve Levine
August 24, 1981
Page 2

The following are my comments on the Na Pali Coast Management Plan Draft EIS:

A. Page 19 - Staff Requirements

Evidently, an increase in park personnel will be needed to service the Na Pali region in order to insure certain results: improved trail maintenance, removal of rubbish, enforcement of camping permits, etc. These are important activities if certain management objectives described in this EIS are to be achieved. In actuality, however, can this increase in manpower realistically be provided? If not, what will be the impact to valued resources in the area?

B. Page 23 - Resource Management Objectives

How will we know when the various management objectives are or are not being met? For example, what kind of information will be required that will indicate that scenic values are/are not being preserved? Is it possible to establish any type of measures for this?

Visible trail cuts may detract from one's appreciation of the scenery especially in the area between Haena and Hanakapiai and the switchback on the western slope of Hanakapiai. Perhaps some type of repair work including growth coverage may be needed.

C. Page 2-11 Issue: "What is the optimum number of visitors for each of the day use destination areas, campgrounds, and trails within the Na Pali Coast area?"

Perhaps a more appropriate question may be: "How much change to the valued resources should be allowed?" By posing this question, attention focuses on the impacted resources which is the most significant aspect of carrying capacity. The question of the optimum number only serves to insure a certain amount of change to the resources, and this is, at best, a very uncertain relationship. There is no guarantee that allowing only 20 visitors will result in _____ amount of change to the resources.

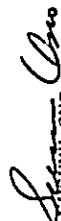
More attention needs to be focused on the behavior of the visitors rather than the sheer number of visitors. Granted, in some areas such as the physical capacity of campgrounds (tent spaces), the number of visitors is an important issue. However

Maximums are established for all campgrounds. Where commercial boat and/or helicopter landings are allowed, all passengers being dropped off must have valid camping permits. A maximum number of drop offs is established for commercial access, but non-commercial access is not restricted to enable hikers or private boaters to take advantage of any available space not taken by commercial access. No restrictions are established for commercial pick up of park visitors.

As indicated on pages 45 and 46, no significant expanded use of Nualolo Kai has been proposed. A maximum of 20 visitors per day will be allowed but only 10 visitors a day will be allowed camping permits. Until archaeological research is completed, no camping is being allowed and the park is closed from October 1 to May 1. Our records indicate visitor use has averaged less than 10 people per day in summer use periods and we anticipate this current average use level will not change significantly. However, Nualolo Kai is the only area on the Na Pali Coast which has a protective reef with clear water and a deep protected area so we feel it would be particularly attractive for recreational use even though expanded use is not being proposed.

If new uses of the Na Pali Coast are proposed or existing uses are expanded to new areas on the coast, additional public input will be sought and the necessary regulatory requirements will be met.

Very truly yours,


SUSUMU ONO
Chairman of the Board

2-54

page two

when we speak of the loss of a backcountry experience due to the presence of others, oftentimes we are actually focusing on their behavior, ie. whether they observe the desirable etiquette such as the proper disposal of rubbish, not intruding on the privacy of other campers, etc. In cases related to natural resources, the behavior of a few could damage sensitive resources; here again, the gross number of visitors may not be the central issue.

D. Page 2-11 Issue: "Should commercial helicopters and tour boats be allowed to land on the Na Pali Coast?"

Perhaps this is part of a larger question: "Who are the primary users for which the Na Pali Coast State Park is being planned for?" Until this question is resolved, there will continue to be endless arguments regarding the "rights" of a certain segment of visitors to the area.

Determining the primary user for this state park is not an easy decision to make. It may necessitate neglecting a certain segment of the public. However, such a decision is unavoidable unless we are content to mix hikers seeking to escape from the hustle and bustle of urban society with visitors who drop in via helicopters and zodiacs.

One way to resolve this issue is to identify alternative recreational opportunities in the state that visitors will find satisfactory. This concept was addressed on page 22, Future Planning Needs. By obtaining such a statewide overview of recreational opportunities, we will be able to "assign" certain regions for a certain portion of the public. Such an approach will not only reduce conflicts within certain regions, but it will also guarantee that the needs of each user group are being met. In summary, all parks need not and in most cases cannot satisfy the needs of everyone. Priorities must be set as to the intended audience in order to reduce conflicts. The same must be done for the Na Pali Coast.

The EIS correctly points out that different areas within this State Park are intended for a range of uses - from high intensive use (Haena and Polihale) to no use (the valleys between Kalalau and Milolii). The assumption here is that visitors can pick and choose the type of use level that will meet their needs. However, such a range of recreational opportunities is not available to everyone; ie, only a few can afford to pay the cost of being transported to and from Honopu Valley should they desire to experience an area intended for light use. Thus, it may be more accurate to say that the primary user for the valleys between Kalalau and Milolii are visitors who have air/water transportation available to them.

Who are the primary users of the Na Pali Coast State Park? What segment of the public is this park being designed for?

Thank you for the opportunity to comment on this EIS.

John Moriyama
John Moriyama



GEORGE R. BRIDGES
DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 51
HONOLULU, HAWAII 96809

August 11, 1981

SUBJECT: COMMENTS ON THE
EIS FOR THE NA PALI COAST STATE PARK
-PART 2 OF THE EIS-

DIRECTIONS:
COMMENTS AND RECOMMENDATIONS
FOR THE EIS
AND REVISIONS
STATE DEPT.
OFFICE OF LAND DEVELOPMENT

Mr. John Moriyama
717 Olokele Ave., Apt. 3A
Honolulu, HI 96816

Dear Mr. Moriyama:

Your comments on the Na Pali Coast Management Plan Draft EIS have focused on the broader, basic management concerns. While we feel the EIS has identified these concerns, we also recognize that we do not have adequate solutions to many of them. Thus the focus of our management is often on controlling existing use and monitoring this use and the environment in order to establish more permanent solutions.

On page 20, an attempt was made to address the consequences of not obtaining the increased personnel requested. Since personnel needs were estimated about a year ago, authorization has been received for additional enforcement officers and some extra maintenance staff is available by adjusting workloads of existing personnel and adding summer student manpower. Maintenance of spur trails into the valleys has generally been deferred.

Resource management objectives can only be met if the resources are monitored. To some extent these resources are being monitored constantly by the public, staff members and others who are knowledgeable about the area. Recently, a photographic inventory was made of the scenic values, as perceived by parks staff. Of the trails between Haena and Kalalau. This inventory together with the surveys in the EIS appendices provide a baseline for future comparisons.

At the present time, the management plan is really limited to controlling existing types of recreation use in areas traditionally used by visitors and monitoring this use and the resources. We are reluctant to recommend changes in use, except to control numbers of uses, or changes in resource management without first understanding the existing situation and the likely impact of any recommended change. Optimum numbers of visitors are certainly a crude means of measuring management objectives, but we feel this is an appropriate first step given our available manpower and expertise. Commercial helicopters and tour boats have also been an existing use. Until such time as we can make a statewide overview of our public outdoor recreation opportunities and see where the Na Pali Coast fits

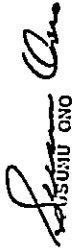
Mr. John Moriyama
August 11, 1981
Page 2

Within these opportunities and public needs, it will be difficult to justify using or not using these commercial transportation services. Currently the primary users of the valleys between Kalalau and Milolii are hunters and other Kauai residents, who are able to obtain boat access.

Your continued interest and input into this project is greatly appreciated.

2-56

Very truly yours,


KUSUMU ONO
Chairman of the Board

William K. Yikuchi
President
Professional Association of Pacific Archaeologist (PAPA)
3-1901 Kaunualii Highway
Lihue, HI 96766

April 26, 1981

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

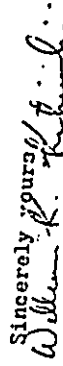
Re: Draft, Environmental Impact Statement, March 1981.
Ma Pali Coast Management Plan

Sir:

Thank you for allowing PAPA to review the EIS Draft for the Ma Pali Coast Management Plan. Our comments are as follows:

1. In the final copy of the EIS please include the State site numbers for all archaeological features. The Manuscript of the archaeological site survey can be left as is, except a page of equivalent state site numbers should be added as a preface.
2. On page 43, Honopu is said to be without archaeological significance. This is not true. The large sanddune fronting Honopu was found in the late 1940s and early 1950s to contain buried archaeological sites. This dune must be included as significant.
3. On page 26, the question of monitoring archaeological sites was mentioned. How will this be managed and who will be considered to manage it? This should also be outlined.
4. Also on page 26, only qualified archaeological complexes are to be placed on the State or National Register. PAPA believes that the entire area should be complexed into one historic district, not split into smaller complexes.

Again, thank you for the opportunity to participate in the EIS draft input. Mahalo nui.

Sincerely yours,

William K. Yikuchi

cc. State Parks Div. DLNR



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 21
HONOLULU, HAWAII 96821

September 29, 1981

SUSUMU OMO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. MALIBU
DIRECTOR TO THE GOVERNOR

DIVISIONS:
CONSERVATION AND RECREATION
DEVELOPMENT
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Dr. William K. Kikuchi

September 29, 1981

- 2 -

Dr. William K. Kikuchi, President
Professional Association of
Pacific Archaeologists
3-1901 Kaunaulii Highway
Lihue, HI 96766

Dear Dr. Kikuchi:

Thank you for your written response to the Na Pali Coast
Management Plan, Draft Environmental Impact Statement.

Our responses refer to PAPA's specific comments concerning
the archaeological and cultural resources to be addressed and
managed in any State Park planning and development.

1. Our major objective at this time is the development of
a research design for any archaeological work on the
Na Pali Coast. At present, we would like to see the
Na Pali Coast considered one cultural complex such
that all archaeological field work and historical
research would address a specific site or locality
as part of the larger cultural pattern that encompassed
all the Na Pali Coast. This research design needs to
be a comprehensive and integrative approach but also
flexible as new information is obtained from archaeologi-
cal and historical research. To be considered in this
research design will be the system of site numbers. The
assignment of state site numbers will require some time
to sort out past number assignments and a decision on
utilizing the 3200-# system uniformly.
2. Honopu Beach was examined by the archaeologist during
the reconnaissance survey for the state park (1979).
At this time, no sites were located on the beach despite
historical references to a ko'a (fishing shrine) on
Honopu Beach. Your reference to subsurface cultural
deposits in the beach dune may not be visible if there

GEORGE R. HUNTER
DIRECTOR OF WORK

has been a recent buildup of sand or the lack of a
beach face cut. But as you implied, the significance
of the dune cannot be disregarded at this time without
some subsurface testing. Staff archaeologists will
address Honopu Beach prior to any park development and
recommend limited public access if these deposits are
threatened.

3. Staff archaeologists will recommend archaeological
field checks before any changes or developments are
made within the park. Areas with known archaeological
sites will be avoided where possible. Otherwise,
sites will be protected from public impact as much as
possible by vegetation cover and trail re-routing. The
monitoring of these sites as to their condition and public
impact will also be performed by staff archaeologists.
The parks maintenance staff will be made aware of the sites
and archaeological concerns. Because they visit Na Pali
on a regular basis, they will be cognizant of any monitoring
disturbance and will notify staff archaeologists.
will be undertaken every three years or more often in
specific localities if warranted.

4. Part of the research design will be a consideration of
the nomination of Na Pali Coast or portions thereof to
the Federal and/or State Registers of Historic Places.
As you are aware, the Na Pali Archaeologists District
was nominated to the Hawaii Register in 1977 but was
returned to the Historic Preservation Office because
of problems with the boundary alignment and definition.
One response to this problem at that time, was to
consider site complexes rather than a district. These
two alternatives have not been thoroughly studied but
we would like to see this addressed in the research design.
Once an approach has been decided on, we will be able to
revise the earlier nomination.

Thank you again for your interest in the Na Pali project.
If there are any other archaeological concerns which your
organization feels need to be addressed, now or in the future, please
keep us informed.

Very truly yours,

George R. Hunter
GEORGE R. HUNTER
Chairman of the Board

The Sierra Club, Hawaii Chapter

Post Office Box 22897, Honolulu, HI 96822
Telephone: (808) 946-8494

April 28, 1981

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Dear Mr. Ono,

The Hawaii Chapter, Sierra Club, would like to submit the following comments on the draft Environmental Impact Statement for the Na Pali Coast Management Plan.

Since the number (presently six) of helicopter companies flying through the Na Pali Coast area is constantly increasing, then the DLNR must set a limit on the number of flights allowed through the Na Pali Coast Park area.

Furthermore, helicopter flight paths must be modified to stay away from hiking trails, population centers in the Haena and Hanalei areas, and areas where there would be an impact on indigenous bird life.

DLNR regulations should limit landings to one beach at most, and set a maximum number of landings per day.

Sincerely,

George M. Winsley

George M. Winsley

If Kalalau Valley Beach is to be included as a helicopter landing point (which we do not want) landing access should only be allowed during the winter months when boats are not able to land. Summer helicopter landings should be only for rescue or emergency evacuation purposes.



Mauana Pali, by Fiquet, 1937



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 521
HONOLULU, HAWAII 96809

August 24, 1981

Mr. George M. Winsley
76 Sierra Club, Hawaii Chapter
P. O. Box 22897
Honolulu, HI 96822

Dear Mr. Winsley:

Thank you for your written response to the Na Pali Coast Management Plan Draft Environmental Impact Statement.

Unfortunately our department has no direct control over helicopter flights and flight paths. Our jurisdiction is limited to landings on lands which we manage, although in establishing right of entry agreements, we have indicated landing patterns and requested that scenic flights along the Na Pali Coast be flown at no less than 1000 feet elevation above sea level and well away from the camping areas and trails except for purposes of park maintenance or emergencies.

As you may know, the right of entry agreements established with two of the helicopter companies were cancelled by the Board of Land & Natural Resources effective June 1, 1981 for non compliance. Landings for campers have been controlled by limiting the number of campers which can be carried by helicopters. Now stops will be reviewed in view of the previous heavy use and present demand at Milolii.

Thank you for your interest in this project.

Very truly yours,

Susumu Ono

SUSUMU ONO
Chairman of the Board

SUSUMU ONO, Chairman
BOARD OF LAND & NATURAL RESOURCES
1008 K. HAWAII
1505 K. THE COURSE
DIVISIONS
CONSERVATION AND RECREATION
PLANNING AND DESIGN
REGULATORY
STATE MANAGEMENT
PLANNING AND DEVELOPMENT

GEORGE M. WINSLEY
Secretary of Hawaii

2.518

SIERA CLUB KAWAI GROUP COMMENTS ON E.I.S. FOR NA PALI CORRIE

EIS: "...two heliports are currently authorized..."

COMMENT: As an alternative to two beach heliports, consider one beach heliport and one reststop in an isolated valley. This would certainly reduce adverse impact to campers and day visitors on the beach. It will also give visitors an opportunity to step into an otherwise inaccessible scenic valley.

EIS: "Leases will be drawn up for each operator and include the conditions for landing and picking up park visitors..."

COMMENT: Boat routes and helicopter flight paths will be established in order to minimize the disturbance..."

COMMENT: The U.P.C.M.P. is generally limited to controlling boat and helicopter landings. Unless they are also landing, boat and aircraft passing by the coast have not been dealt with."

COMMENT: If a helicopter or boat company is controlled by a lease with the state which restricts landings, that same lease must enforce strictly regulated coastal and sea flight paths at all times (landing or not) with permanent loss of lease as a penalty and automatic enforcement.

EIS: "Noise Impacts..."

COMMENT: Since an acceptable level of noise is a function of verticle distance above, horizontal distance away from, and the nature of the area in question, helicopters should not be allowed in any valley from Naena to Kalalau or close to any area where noise impact could be a question. For instance, if a helicopter is flying near the Pali trail (500 horizontal feet away), a high verticle distance should be maintained (1000 verticle feet above Pali top). Or, if a helicopter is flying further from the Pali trail (1000 horizontal feet away) a lower verticle distance could be maintained (500 feet above Pali top). Areas not containing hiking trails, beaches, nor inhabited by native birdlife could have regulated flight paths closer to the Pali.

EIS: "Kilohli commercial drop offs will be limited to 70% of the maximum number of visitors allowed..."

COMMENT: Since this park beach is the only one heavily used by "Kawai locals", it would be a grave mistake to limit the number of private boat visitors to 30% of the camping permits issued. The situation changes in the winter when boat access is more difficult. Therefore, the 70% maximum number of visitors allowed via commercial access should be for winter only, and 70% of visitor permits for private boat access should be allowed in summer months.

ADDITIONAL COMMENTS:

COMMENT: Many of the park streams lack safe drinking water as evidenced by the coliform counts. More detailed information of this type should be made available to the public. Perhaps a weekly count of all the streams a person might drink from, especially along the trail and beaches from Naena to Kalalau, could be posted along with other safety information at the trailhead. This information would not only benefit the public, but would help the state manage sanitation problems.

COMMENT: A ranger station at Naena should be one of the main priorities of this plan. Since building of a ranger station is being deferred to the Naena Park plan, it must be addressed at the soonest possible time. This single facility could correct most of the shortcomings of the U.P.C.M.P. such as difficulty in obtaining permits, minimal visitor information, lack of safety warnings, and lack of permit enforcement.

COMMENT: Due to the nature of the wilderness experience, visitors to the park (both hikers and "landed" visitors) will continue to suffer from emergency situations: broken bones, sprained ankles, flash floods and near drownings, to name a few. Commercial transport companies have provided a much-needed rescue capability, and these companies must be encouraged to continue this important service in the future.

David R. Weber
David R. Weber
LAWRENCE
KAWAI GROUP, SIERRA CLUB
P.O. Box 5412
Lihue, HI. 96750

GEORGE B. BRADSHAW
Commissioner of Land



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 51
HONOLULU, HAWAII 96809

SUSUNU OHO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. HAYES, JR.
SECRETARY TO THE COMMISSIONER
DIVISIONS:
CONSERVATION AND RECREATION
CONSERVATION
FISH AND GAME
FOREST
LAND ACQUISITION
STATE PARKS
WATER AND LAND DEVELOPMENT

August 24, 1981

Mr. David R. Weber
Chairman, Kauai Group Sierra Club
P. O. Box 3419
Lihue, HI 96766

Dear Mr. Weber:

Thank you for your written response to the Na Pali Coast Management Plan Draft EIS.

The question of commercial access to the Na Pali Coast continues to be a major public concern and we will certainly be looking at a number of alternatives to provide desired transportation services with the least environmental impact. We agree that limiting any reststop, if needed, to an isolated valley is desirable in view of the frequent landings which were occurring at Milolii near the camp ground.

As we indicated in our response to the Hawaii Chapter of the Sierra Club, our department has no direct control over helicopter flights and flight paths. Our jurisdiction is limited to landings on lands which we manage, although in establishing right of entry agreements, we have indicated landing patterns and stipulated that scenic flights along the Na Pali Coast be flown at not less than 1000 feet elevation above sea level and well away from the camping areas and trails except for purposes of park maintenance or emergencies. As you may know, the right of entry agreements established with two of the helicopter companies were cancelled by the Board of Land and Natural Resources effective June 1, 1981 for non compliance.

The EIS has been amended to reflect your suggestion for commercial drop offs at Milolii. Actually, we have not experienced any problem to date and considering the increasing costs of helicopter flights commercial drop offs are expected to be limited though exceeding established maximum is certainly possible.

Mr. David R. Weber
August 24, 1981
Page 2

While there may be times when Na Pali Streams would provide safe drinking water, frequent testing is not feasible or necessarily reliable so we must assume that any surface water is not safe to drink. All permittees are told to treat the water and signs are posted in frequently used areas. A station at the Maena trail head would certainly be helpful, but in the meantime we are trying to improve our permits and information systems in other ways. We share your appreciation for the emergency services being provided by commercial helicopter companies and the government, including a recent night rescue of one of our park employees.

Your continued interest and constructive suggestions will be an important means of continually improving the management of the Na Pali Coast.

Very truly yours,

SUSUNU OHO
Chairman of the Board

2-60

APPENDIX A

Number of Visitor Nights at
Na Pali Coast Camp Sites

Month	Number of Visitor Nights (Average Per Night) at Each Camp Ground					Total Visitor Nights
	Hanakapiai	Hanakoia	Kalalau	Nualolo Kai	Milolii	
<u>June 1979</u> (24 nights)	221 (9.2)	141 (5.9)	616 (25.7)	4 (0.2)	42 (1.8)	1,024 (42.7)
<u>July</u> (31 nights)	600 (19.3)	365 (11.8)	1,901 (61.3)	13 (0.4)	103 (3.3)	2,982 (96.1)
<u>August</u> (31 nights)	760 (24.5)	528 (17.0)	2,964 (96.2)	44 (1.4)	298 (9.6)	4,594 (148.2)
<u>September</u> (30 nights)	428 (14.3)	354 (11.8)	1,641 (54.7)	10 (0.3)	45 (1.5)	2,478 (82.6)
<u>October</u> (21 nights)	207 (9.0)	197 (8.3)	746 (27.9)	--	--	1,150 (54.8)
<u>December</u> (22 nights)	290 (13.2)	153 (7.0)	689 (31.3)	--	--	1,132 (51.5)
<u>January 1980</u> (31 nights)	184 (5.9)	198 (6.4)	621 (20.0)	--	--	1,003 (32.4)
<u>February</u> (29 nights)	152 (5.2)	147 (5.1)	464 (16.0)	--	--	763 (26.3)
<u>March</u> (31 nights)	231 (7.5)	204 (6.6)	944 (30.5)	--	49 (1.6)	1,379 (44.5)
<u>April</u> (30 nights)	195 (6.5)	251 (8.4)	896 (29.9)	10 (0.3)	4 (0.1)	1,355 (45.2)
<u>May</u> (31 nights)	389 (12.5)	343 (11.1)	1,669 (53.9)	5 (0.2)	108 (3.5)	2,514 (81.1)
<u>Total</u> (311 nights)	3,657 (11.8)	2,881 (9.3)	13,151 (42.3)	86 (0.3)	649 (2.1)	20,374 (65.5)

Source: Camping Permits
(honolulu office)

Number of Campers at
Na Pali Coast Camp Sites

Month	Campgrounds					Total Campers	Total Permits Issued	Ave. campers per permit
	Hanakapiai	Hanakoa	Kalalau	Nualolo Kai	Milolii			
June 1979	162	120	219	2	12	340	142	2.4
July	446	319	612	17	48	711	300	2.4
August	623	470	974	23	112	1,432	504	2.4
September	357	325	548	5	18	560	274	2.0
*October	176	167	222	--	--	266	126	2.1
*December	220	133	224	--	--	313	161	1.9
January 1980	150	137	198	--	--	210	109	1.9
February	115	116	151	--	--	178	98	1.8
March	211	190	294	--	--	373	171	2.2
April	194	216	284	2	1	329	156	2.1
May	338	297	524	2	34	635	278	2.3

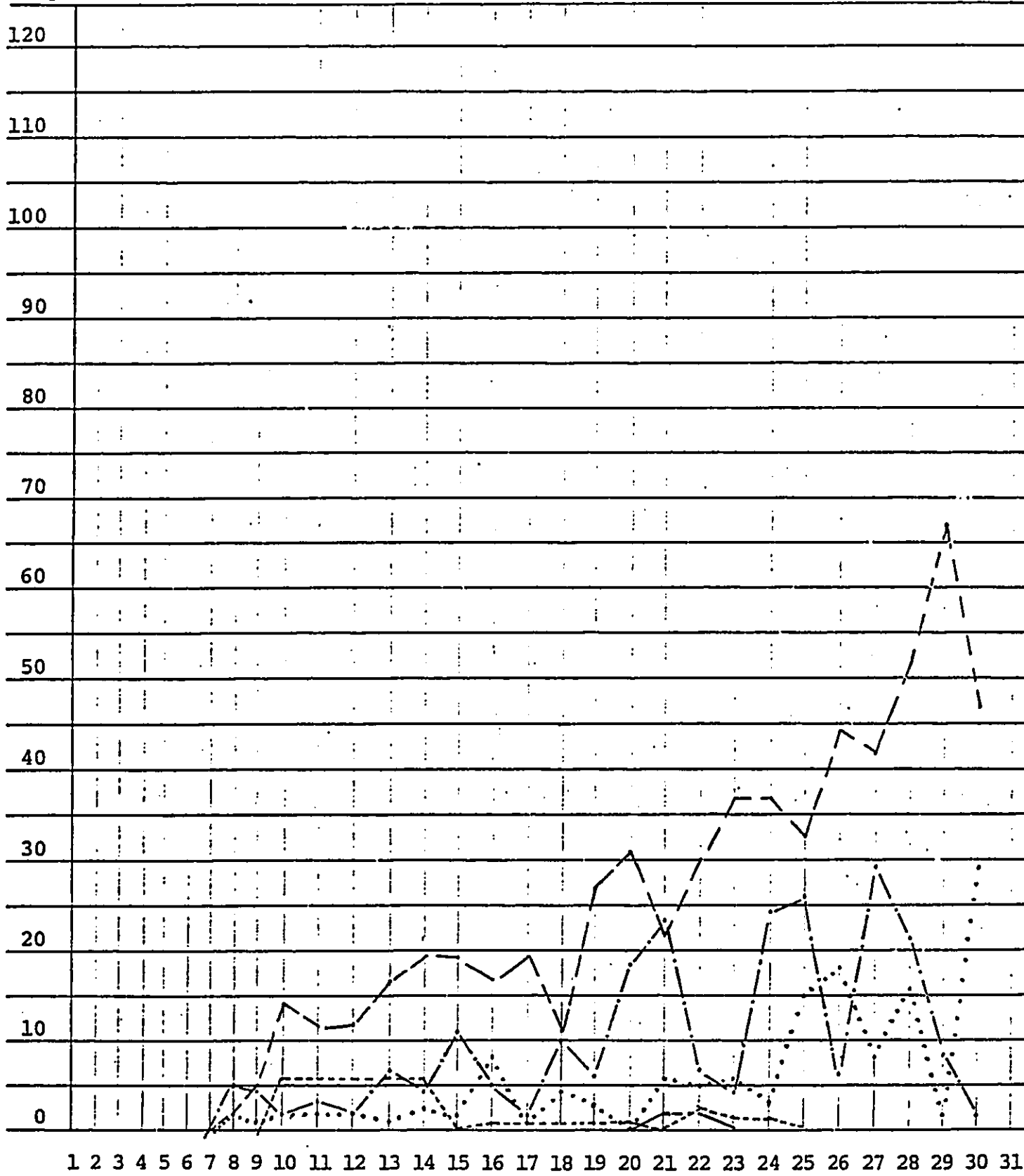
*No permits issued from October 22 to December 10, 1979 due to UPW strike.

Source: Camping Permits
(Honolulu office)

Visitor Nights at Na Pali Coast Camp Sites

June 1979

No. of Campers



Days of the Month

Camp grounds:
 Hanakapiai -----
 Hanakoa
 Kalalau -----
 Nualolo Kai.....
 Milolii -----

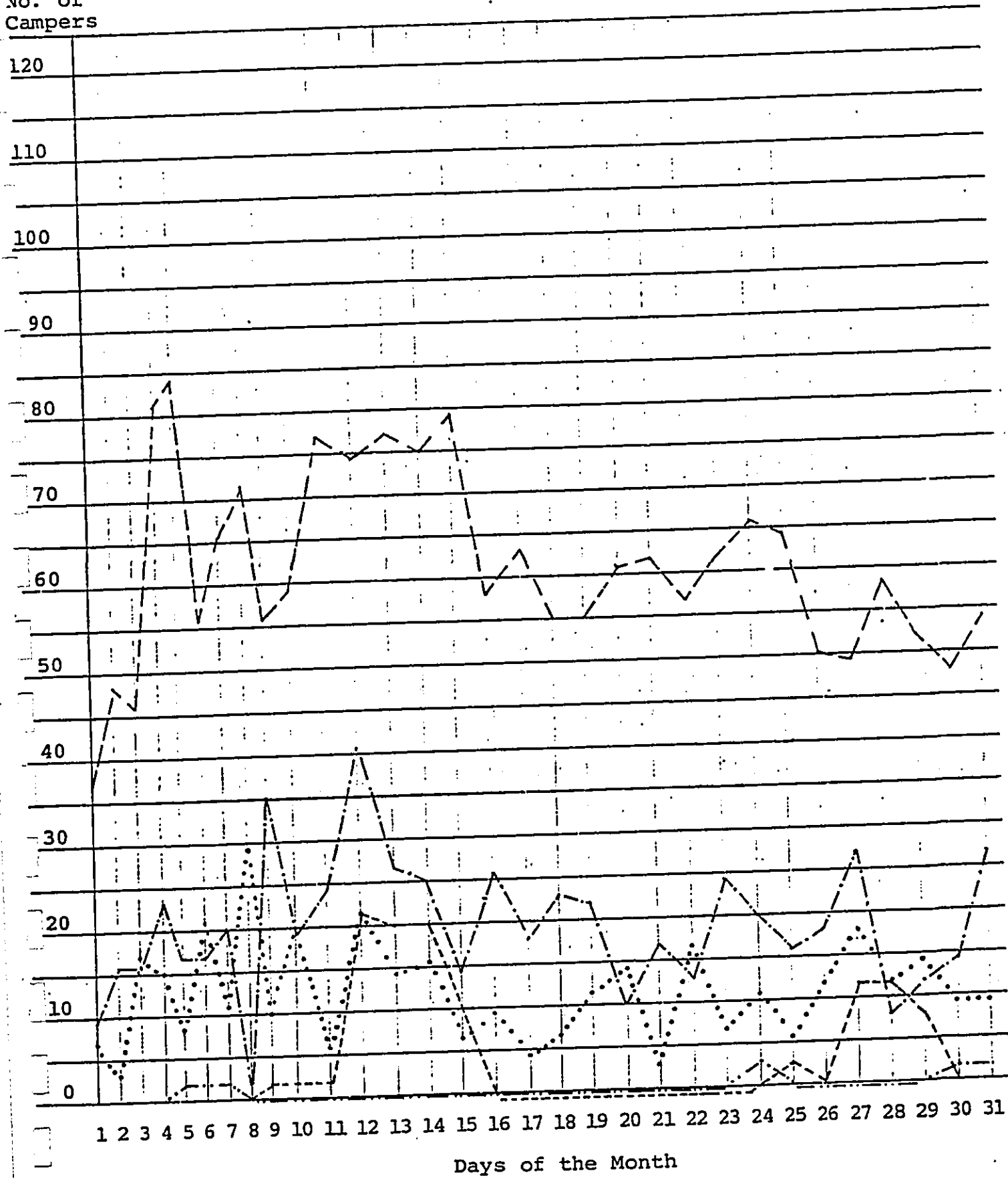
A-3

Source: Camping Permits
 (Honolulu office)

Visitor Nights at Na Pali Coast Camp Sites

July 1979

No. of Campers



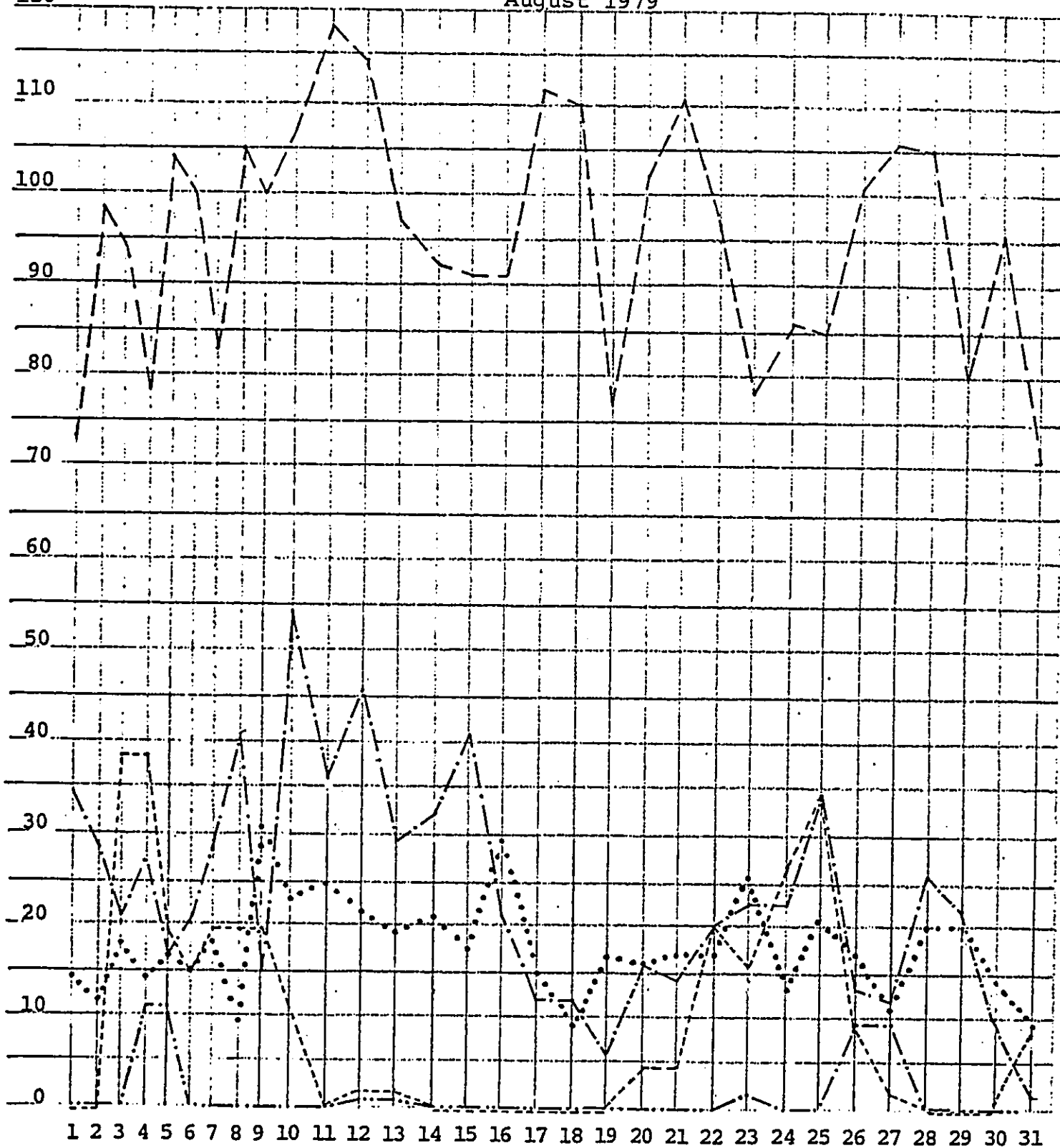
- Camp grounds :
- Hanakapiai _____
 - Hanakoa _____
 - Kalalau _____
 - Nualolo Kai..... _____
 - Milolii ----- _____

Source: Camping Permits
(Honolulu office)

No. of
Campers
120

Visitor Nights at Na Pali Coast Camp Sites

August 1979



Camp grounds:
Hanakapiai
Hanakoa
Kalalau

Nualolo Kai
Milolii

Source: Camping Permits
(Honolulu office)

No. of
Campers
120

Visitor Nights at Na Pali Coast Camp Sites

September 1979

110

100

90

80

70

60

50

40

30

20

10

0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Days of the Month

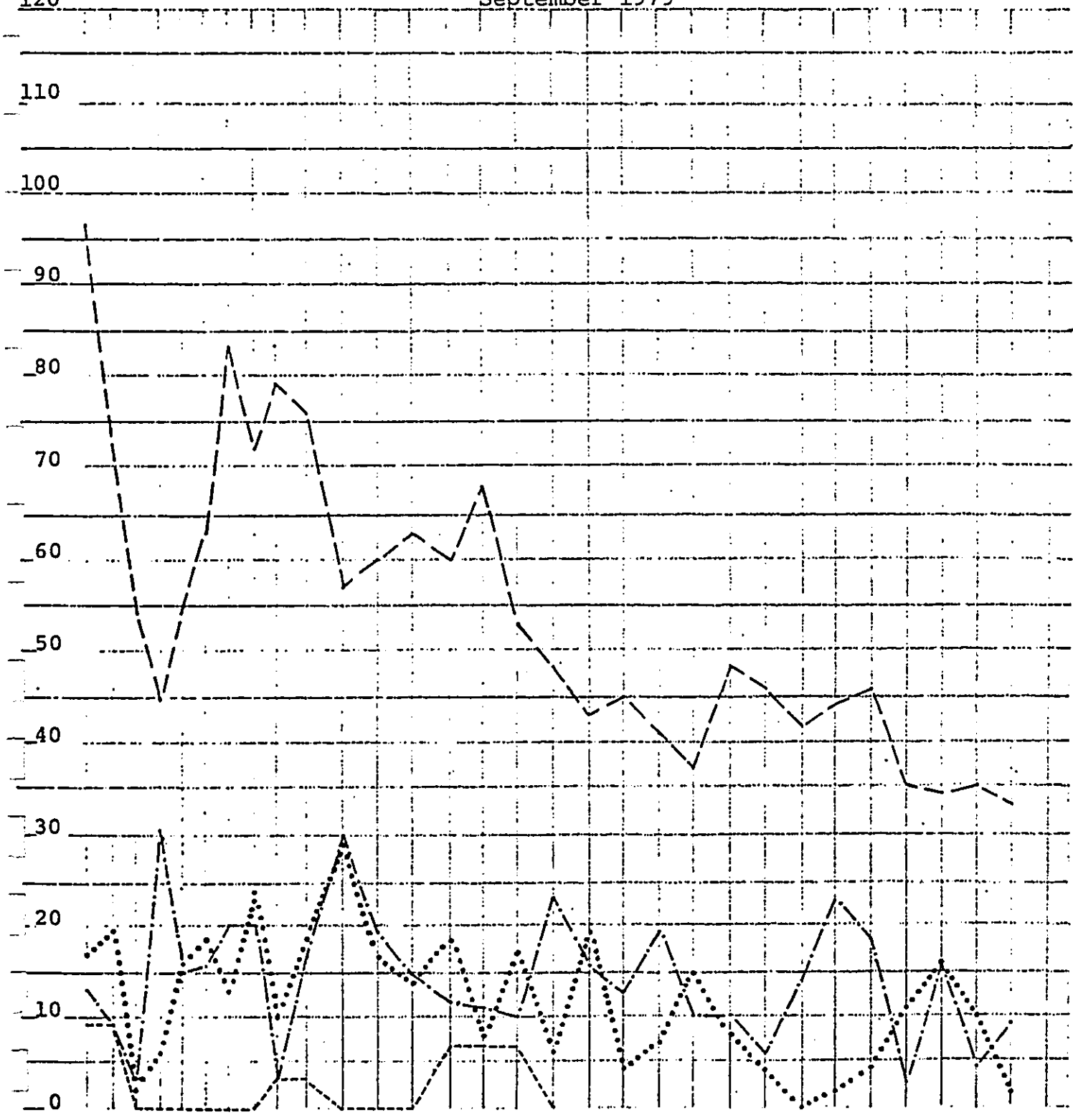
Camp grounds:

Janakapiai
Hanakoa
Kalalau

Nualolo Kai
Milolii

Source: Camping Permits
(Honolulu office)

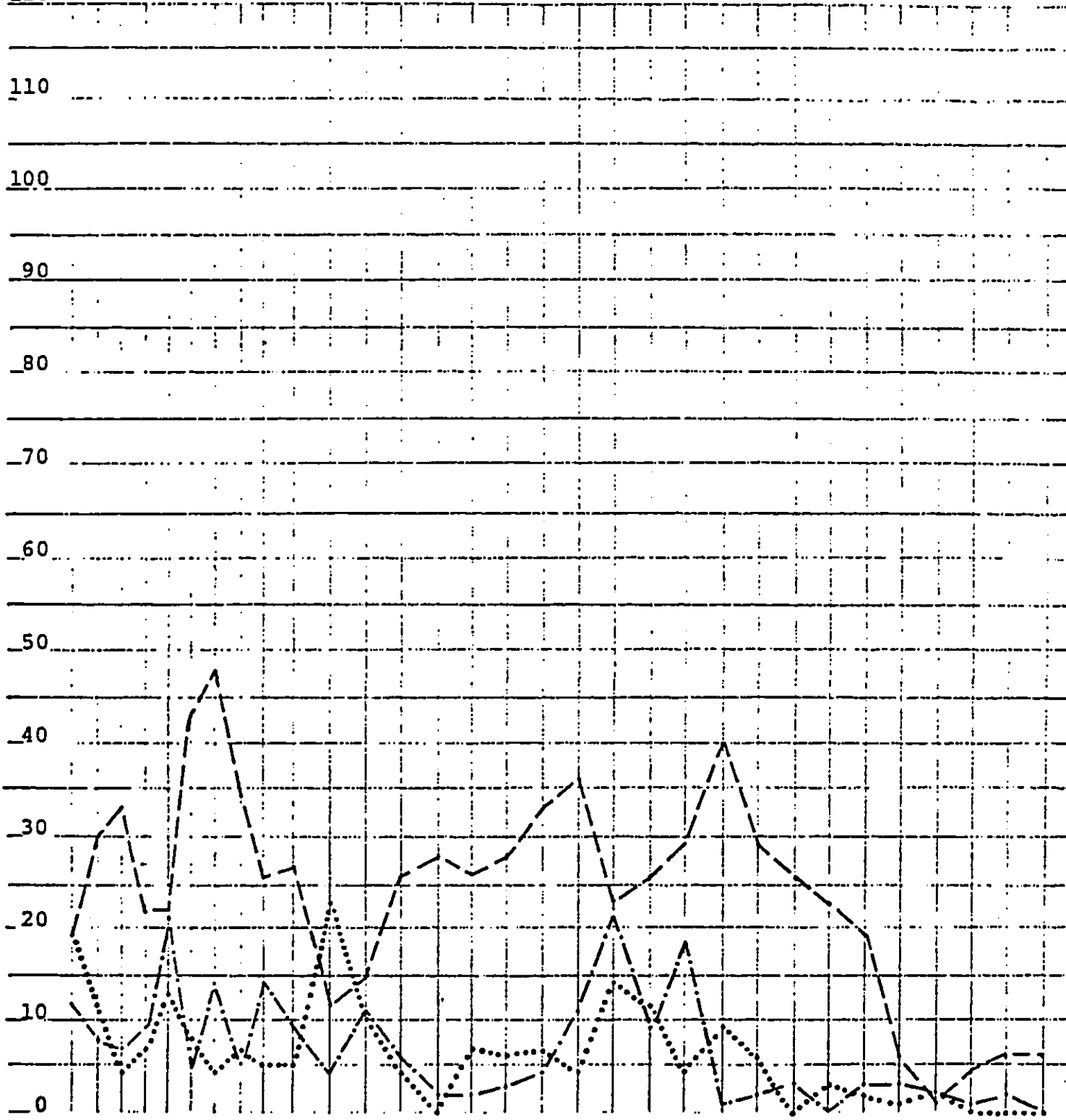
A-6



No. of
Campers
120

Visitor Nights at Na Pali Coast Camp Sites

October 1979



Days of the Month

Camp grounds:
Hanakapiai ————
Hanakoa.....
Kalalau ————
Nualolo Kai.....
Milolii.....

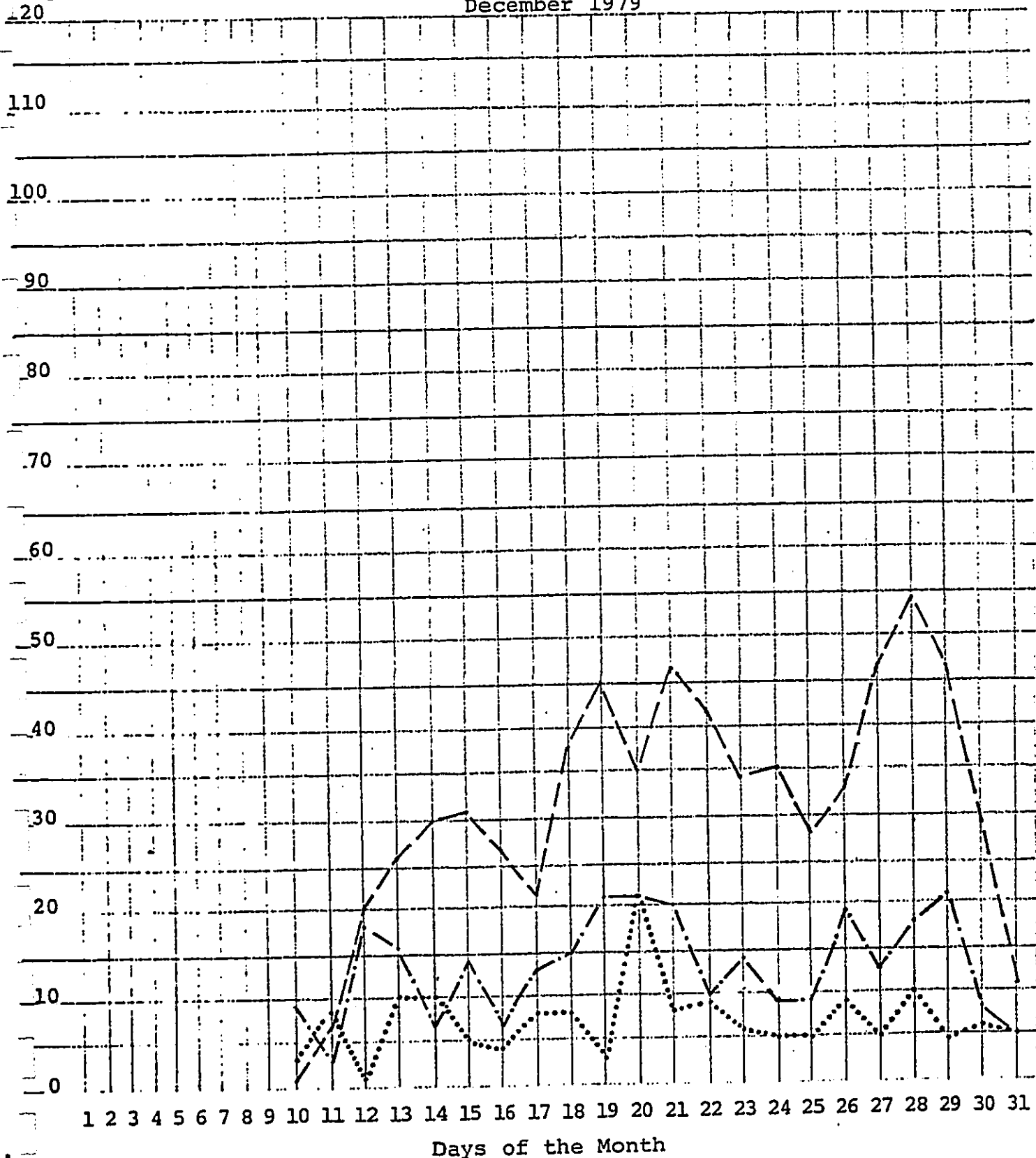
*No permits issued after 10/22 due to UPW strike.

Source: Camping Permits (Honolulu office)

No. of
campers

Visitor Nights at Na Pali Coast Camp Sites

December 1979



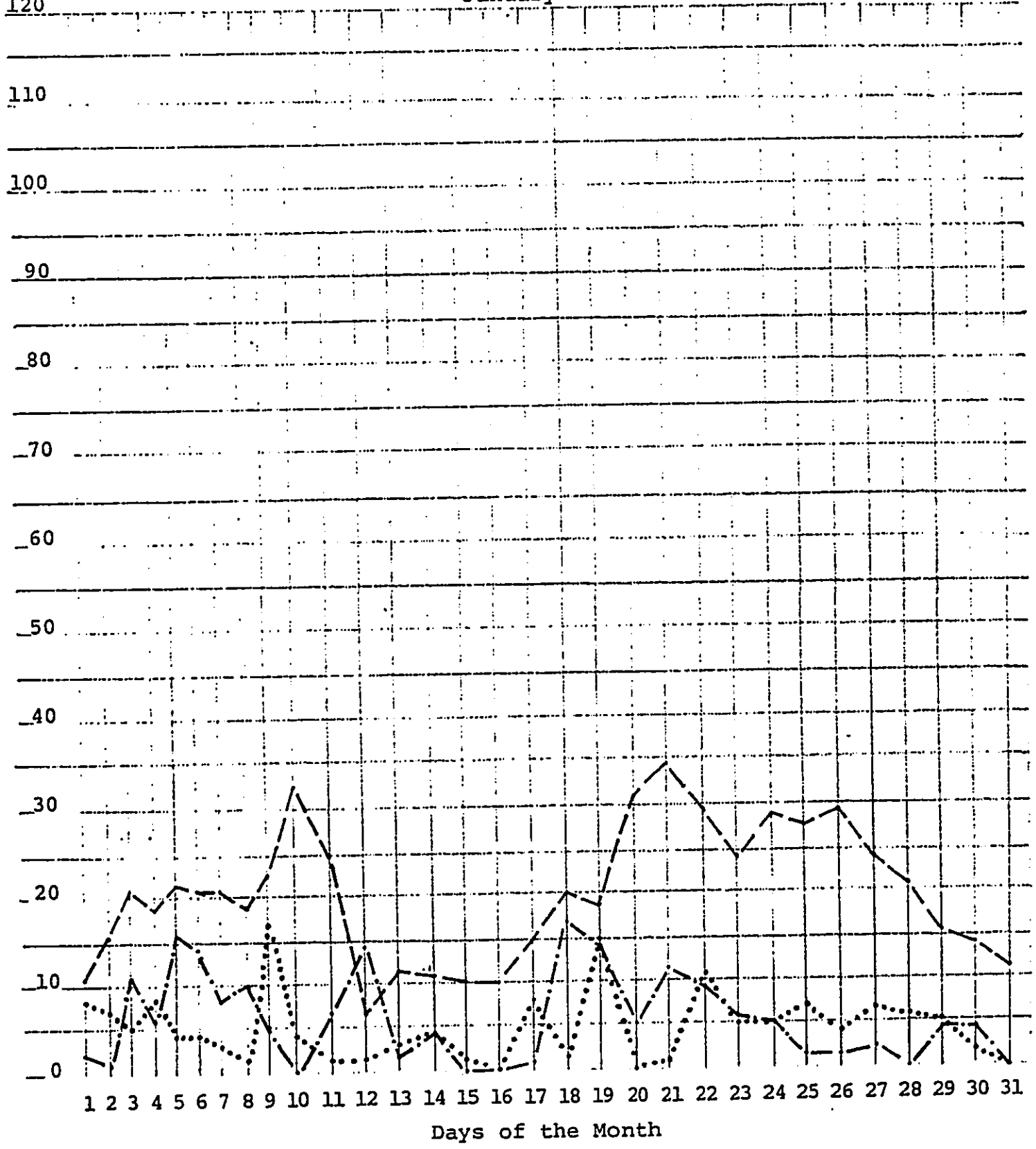
Camp grounds:

- Hanakapiai _____
- Hanakoa.....
- Kalalau _____
- Nualolo Kai.....
- Milolii _____

*No camping permits issued before
12/10 due to UPW strike..
Source: Camping Permits
(Honolulu office)

No. of
Campers
120

Visitor Nights at Na Pali Coast Camp Sites
January 1980



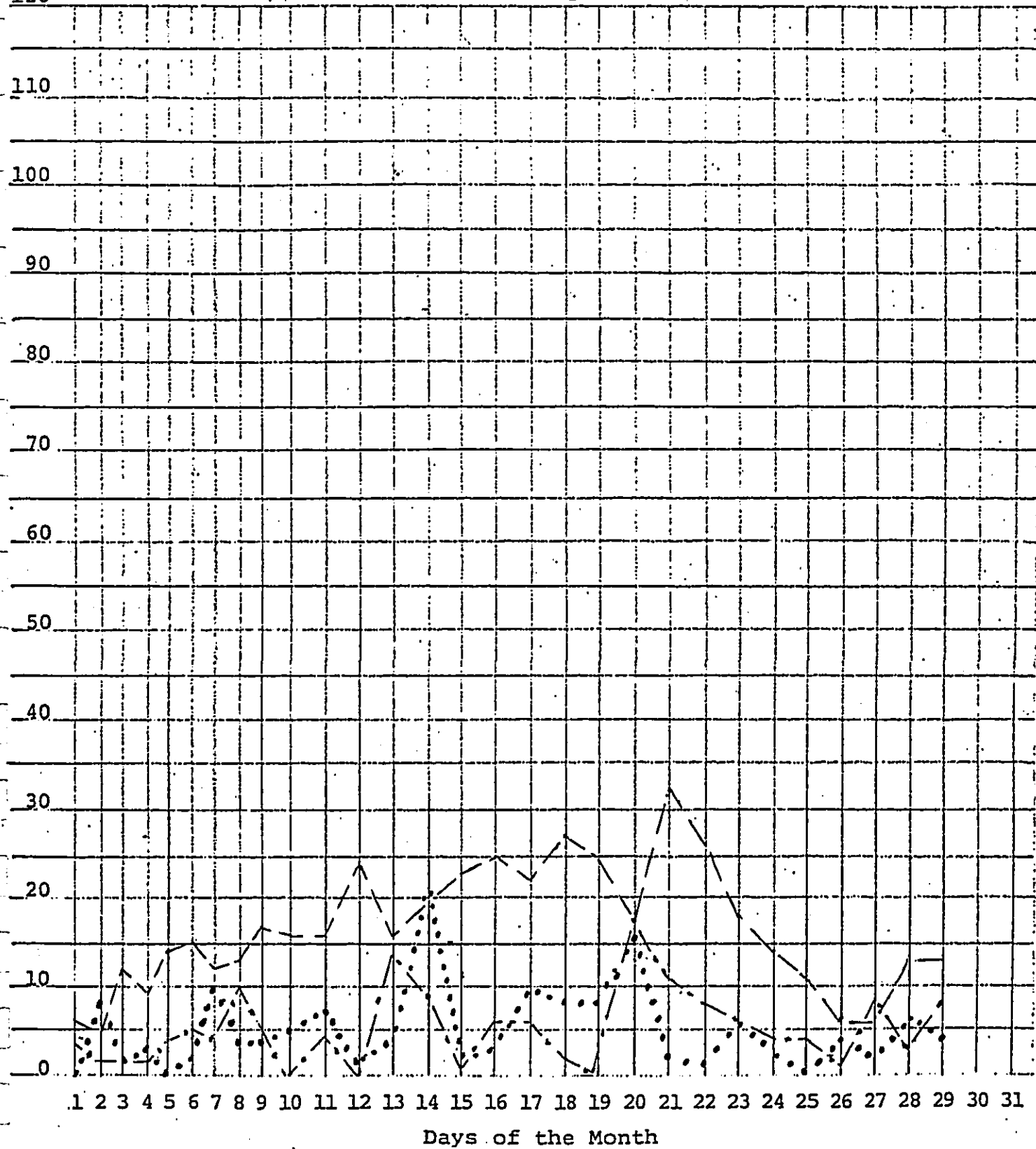
Camp grounds:
Hanakapiai —————
Hanakoa
Kalalau —————
Nualolo Kai
Milolii -----

Source: Camping Permits
(Honolulu office)

No. of
Campers
120

Visitor Nights at Na Pali Coast Camp Sites

February 1980



Camp grounds:
Hanakapiai —————
Hanakoa
Kalalau —————
Nualolo Kai.....
Milolii —————

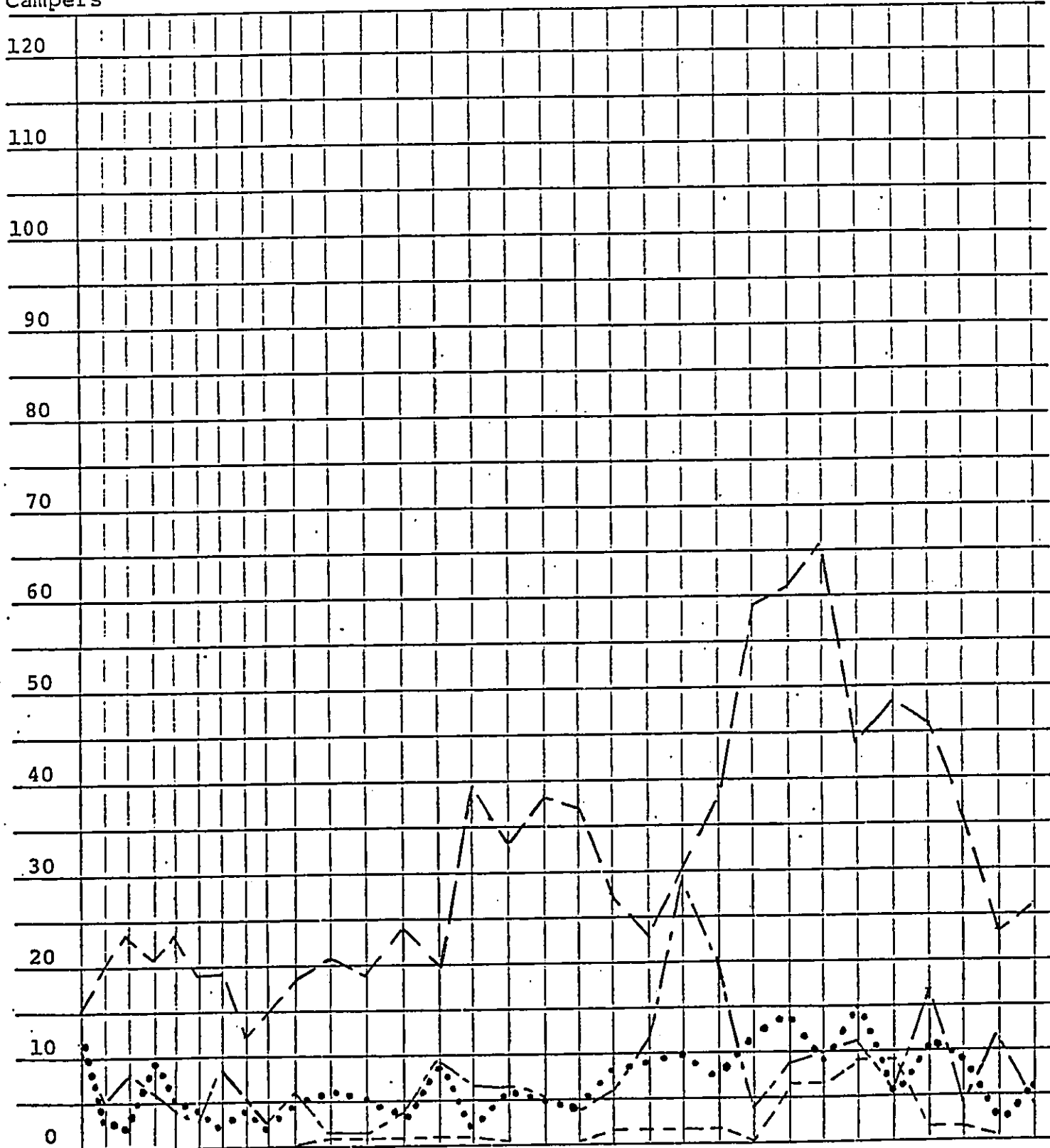
Source: Camping Permits
(Honolulu office)

A-10

Visitor Nights at Na Pali Coast Camp Sites

No. of Campers

MARCH 1980



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Days of the Month

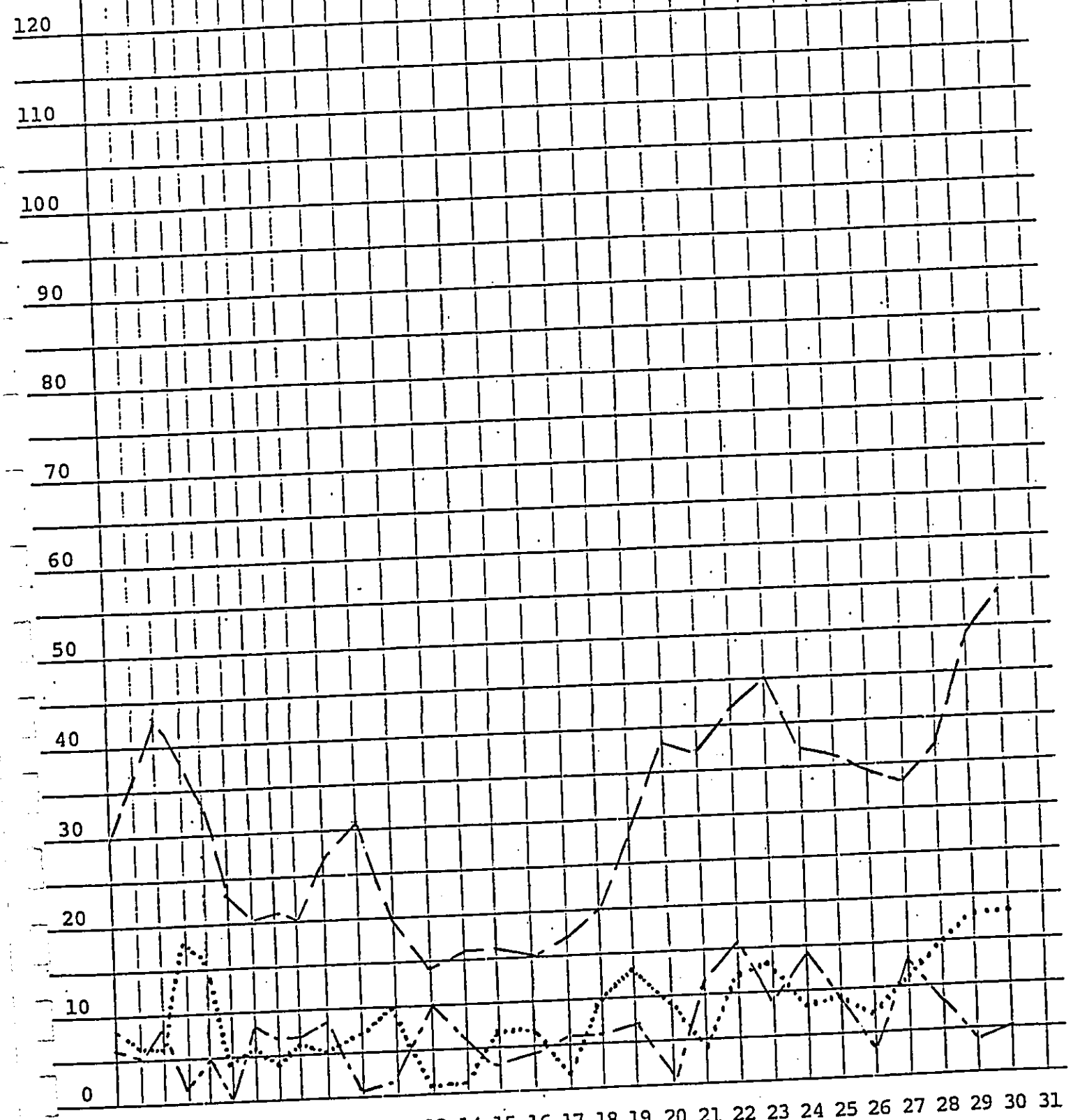
Camp grounds:

- Hanakapiai -----
- Hanakoa A-11
- Kalalau -----
- Nualolo Kai.....
- Milolii -----

Source: Camping Permits
(Honolulu office)

APRIL 1980

No. of Campers



Days of the Month

- Camp grounds:
- Hanakapiai _____
 - Hanakoa (dotted)
 - Kalalau _____ (dashed)
 - Nualolo Kai..... (dash-dot)
 - Milolii..... (long-dashed)

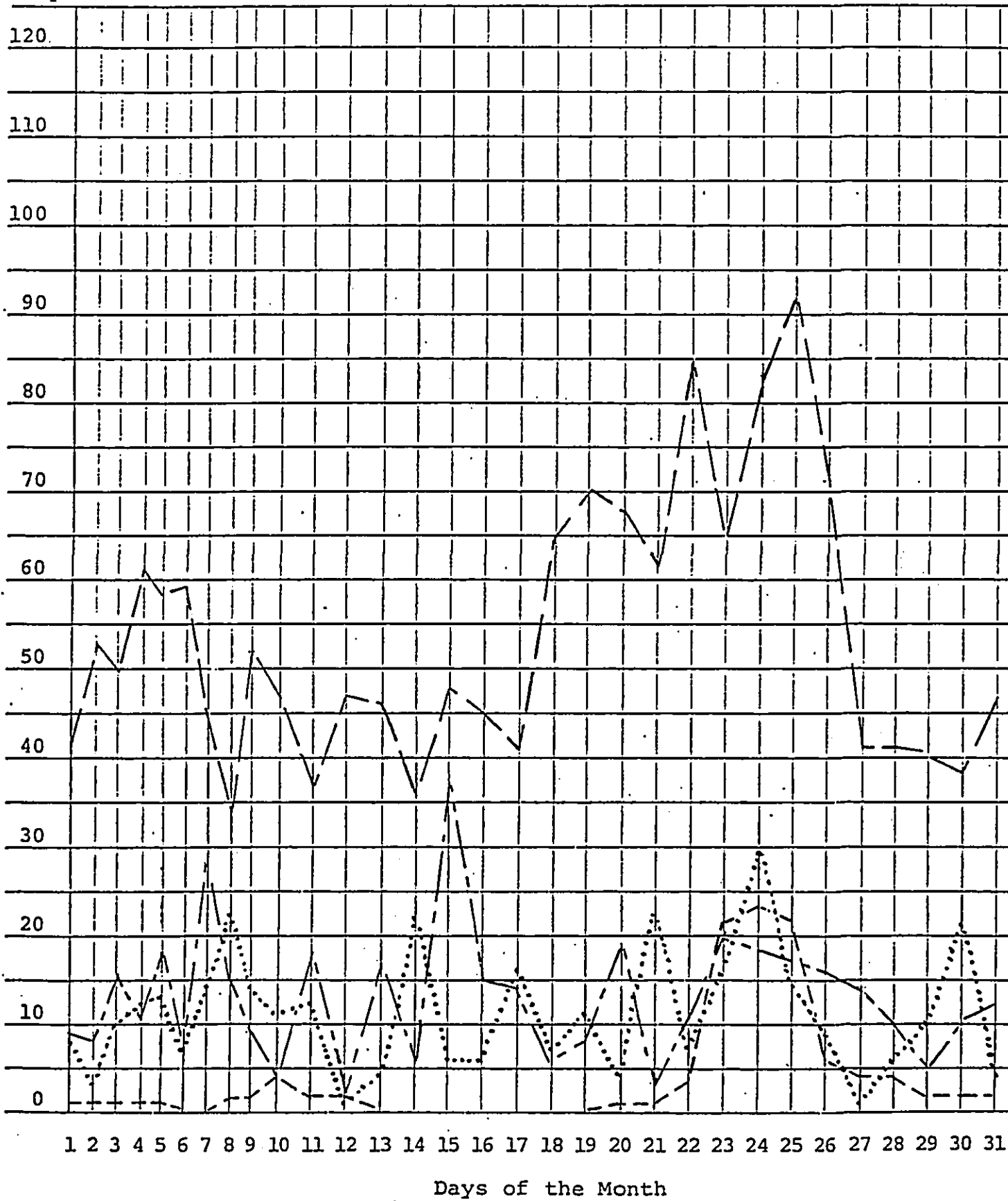
A-12

Source: Camping Permits
(Honolulu office)

Visitor Nights at Na Pali Coast Camp Sites

No. of Campers

MAY 1980



Camp grounds:
 Hanakapiai
 Hanakoa.....
 Kalalau
 Nualolo Kai.....
 Milolii.....

Source: Camping Permits
 (Honolulu office)

Na Pali Coast Visitor Mail Survey Response

Date	# of Permits	# of Questionnaires Mailed	# Returned ¹ Unopened	# of Responses	% of ² Response
June 1979	142	56	9	16	34%
July	300	98	11	37	43%
August	504	121	4	42	36%
September	274	123	10	48	42%
October	126	62	5	20	36%
December	197	90	3	44	51%
January 1980	82	52	3	18	37%
February	98	57	7	24	48%
March	171	--	--	--	--
April	156	78	5	23	32%
May	278	89	6	31	37%

¹ Mostly insufficient address, wrong address or moved and left no forwarding address.

² Based on the number of questionnaires mailed minus unopened returns divided into the number of responses.

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NA PALI COAST SURVEY RESPONSES

Month	Permit Information Data for All Permittees				User Survey Responses																											
	Permit Responses	Average No. Nights Per Permit	Average No. Persons Per Permit	Permanent Residence	Average No. Nights Per Permit	Average No. in Group	How Permit Obtained	When Permit Obtained	Means of Access			Means of Travel to Trail Head			No. of Nights Stayed in each Camp Site (nights indicated on permit)				Activities Participated In													
			Kauai	Neighbor Is.	Mainland U.S.	Foreign	Mail	Over Counter	Same Day	2-5 Days Prior	1-2 Weeks Prior	2+ Weeks Prior	One Way	Both Ways	Hike	Charter Boat	Private Boat	Helicopter	Dropped off	Drove & Parked	Other	Hanakapiai	Hanalei	Nualolo Kai	Hiking	Swimming	Sun Bathing	Nature Study	Hunting	Fishing		
June 1979	14 (144)	1.8 (7.2)	2.4 (19)	2 (26)	10 (97)	1 (8)	2 (12)	5 (35)	8 (56)	1 (8)	1 (8)	1 (8)	14 (112)	30 (240)	13 (104)	7 (56)	1 (8)	1 (8)	5 (40)	2 (16)	7 (56)	1 (8)	1 (8)	1 (8)	14 (112)	9 (72)	11 (88)	14 (112)	1 (8)	1 (8)	1 (8)	
July	35 (302)	3.1 (9.9)	2.4 (213)	4 (43)	26 (213)	2 (14)	9 (27)	13 (40)	8 (25)	5 (15)	8 (24)	5 (15)	4 (12)	30 (90)	30 (90)	6 (18)	6 (18)	1 (3)	15 (45)	5 (15)	12 (36)	1 (3)	1 (3)	1 (3)	33 (99)	32 (96)	32 (96)	31 (93)	3 (9)	1 (3)	3 (9)	
August	38 (493)	2.8 (9.1)	2.4 (54)	3 (62)	33 (353)	0 (24)	16 (48)	23 (70)	5 (15)	14 (42)	8 (24)	12 (36)	9 (27)	28 (84)	35 (105)	11 (33)	6 (18)	1 (3)	19 (57)	18 (54)	13 (39)	2 (6)	1 (3)	1 (3)	36 (108)	36 (108)	36 (108)	36 (108)	2 (6)	4 (12)	4 (12)	
September	41 (274)	2.3 (9.0)	2.0 (27)	5 (30)	29 (197)	0 (20)	11 (33)	30 (90)	15 (45)	15 (45)	3 (9)	8 (24)	7 (21)	34 (102)	40 (120)	4 (12)	6 (18)	1 (3)	19 (57)	19 (57)	15 (45)	1 (3)	1 (3)	1 (3)	55 (229)	23 (94)	36 (144)	26 (104)	2 (8)	2 (8)	2 (8)	
October	20 (126)	2.2 (9.1)	2.1 (5)	1 (9)	19 (106)	6 (6)	1 (3)	19 (57)	6 (18)	13 (39)	4 (12)	5 (15)	1 (3)	19 (57)	20 (60)	2 (6)	1 (3)	1 (3)	5 (15)	5 (15)	9 (27)	1 (3)	1 (3)	1 (3)	44 (132)	27 (81)	16 (48)	22 (66)	30 (90)	1 (3)	1 (3)	1 (3)
December	44 (161)	3.8 (7.0)	1.9 (7)	3 (16)	32 (116)	2 (23)	10 (34)	13 (44)	20 (68)	4 (13)	5 (16)	5 (16)	44 (152)	44 (152)	44 (152)	24 (84)	24 (84)	1 (3)	14 (42)	8 (24)	24 (72)	1 (3)	1 (3)	1 (3)	44 (132)	43 (129)	16 (48)	22 (66)	30 (90)	1 (3)	1 (3)	1 (3)
January 1980	17 (109)	4.4 (9.2)	1.6 (1.9)	0 (2)	12 (77)	2 (19)	16 (48)	6 (18)	11 (33)	6 (18)	11 (33)	11 (33)	17 (51)	17 (51)	17 (51)	17 (51)	17 (51)	1 (3)	10 (30)	7 (21)	7 (21)	1 (3)	1 (3)	1 (3)	16 (48)	6 (18)	14 (42)	11 (33)	0 (0)	1 (3)	1 (3)	1 (3)
February	24 (98)	4.1 (7.8)	1.8 (1.8)	0 (4)	19 (88)	4 (17)	5 (15)	20 (60)	6 (18)	12 (36)	2 (6)	5 (15)	5 (15)	22 (66)	22 (66)	22 (66)	6 (18)	6 (18)	12 (36)	2 (6)	6 (18)	4 (12)	4 (12)	4 (12)	20 (60)	13 (39)	16 (48)	12 (36)	0 (0)	0 (0)	0 (0)	0 (0)
March (no survey)	(171)	(8.1)	(2.2)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)	(--)
April	23 (156)	4.2 (8.7)	2.1 (2.1)	3 (7)	16 (127)	0 (11)	9 (27)	15 (45)	5 (15)	7 (21)	5 (15)	5 (15)	22 (66)	22 (66)	22 (66)	11 (33)	11 (33)	1 (3)	8 (24)	4 (12)	11 (33)	1 (3)	1 (3)	1 (3)	14 (42)	11 (33)	13 (39)	16 (48)	9 (27)	0 (0)	0 (0)	0 (0)
May	31 (278)	4 (9.0)	3.1 (2.3)	4 (30)	22 (213)	1 (19)	8 (24)	23 (70)	7 (21)	15 (45)	3 (9)	5 (15)	5 (15)	21 (63)	29 (87)	10 (30)	10 (30)	1 (3)	10 (30)	6 (18)	14 (42)	2 (6)	2 (6)	2 (6)	19 (57)	22 (66)	30 (90)	26 (78)	18 (54)	0 (0)	1 (3)	1 (3)

NA PALI COAST VISITOR LIKES/DISLIKES

Main Likes/Dislikes Expressed	Number of Likes/Dislikes Expressed by Months												Total Months and % of Total Respondents	
	June 1979	July	Aug	Sept	Oct	Nov	Dec	Jan 1980	Feb	Mar	Apr	May		
Likes: Beauty-Scenic Area	D	24	23	31	14		33	9	8		14	18	174	57%
Isolation/Tranquility	A	6	10	13	4	P	11	3	6	N	5	7	65	22%
Helicopter Access Permit Restrictions	T	1	2	2		A				0			5	2%
Helicopter Access	A		1	2	1	R	1						5	2%
Dislikes: Helicopter Access		10	8	8	5	K	15	2	3	S	5	9	70	23%
Boat Access	N	4	6	1			2			U		2	15	5%
Too Crowded	O	2	3	7	1	C	4	1		R		3	21	7%
Permit Time Restrictions	T	3	2	2	3	L	1	2		V		2	15	5%
Permit Inconvenient to Obtain		1	3	2		0	2	1	2	E			11	4%
Permit Enforcement Lax	U	2		5	1	S	2	2	2	Y	2	2	18	6%
Campground Maintenance	S	4	13	17	4	E	13	8	9		5	11	84	28%
Trail/Condition Maintenance	E		6	5	3	D	7	1	6	T	4	9	41	13%
Too Many Signs/Spray Paint	A		2	5	2			2	1	A		2	14	5%
Too Few Signs	B		1		1		1	1		K		1	5	2%
No Public Transp. to Trailhead	L	1	6	6	2		4		4	E		1	24	8%
	E									N				
Total No. of Survey Responses	16	37	42	48	21		44	18	24		23	31	304	

Source: Visitor Mail Survey

Information
Sought

Visitor Population and Length of Stay

- | | |
|-----------------------|--|
| Reason for
Data | <ul style="list-style-type: none">. Compare amount of use with any impact on natural or cultural resources.. Compare amount of use with visitor satisfaction.. Determine facility and facility maintenance needs.. Determine seasonal variation. |
| Data
Sources | <ul style="list-style-type: none">. Camping and day use permits.. Permittee sample mail surveys.. Periodic field counts.. Periodic field checks on visitor permits.. Number of permit requests denied because of reservation limits. |
| Adequate
of Data | <ul style="list-style-type: none">. No day use data for Hanakapiai.. Data on permits should give a good day to day indication of the numbers of visitors and their length of stay but must be supplemented with periodic actual counts to determine the accuracy of the permit data and mail survey responses.. According to the Lihue Office at least 15% of the campers did not use their permits, but there are no figures to support this . Actual counts should also include people with valid permits for a campground other than the one they are staying in. |
| Tentative
Findings | <ul style="list-style-type: none">. 1979 counts show that permit data on length of stay and numbers of visitors is relatively consistent with actual reported use from mail surveys.. Mail surveys indicate the campgrounds actually used varied significantly from the campgrounds assigned by the permit for campers whose destination was Kalalau Valley. |

Information
Sought

Visitor Control System

- | | |
|--|--|
| Reason for
Data | . Determine if the permit system is controlling the number, location, and means of access of visitors as intended. |
| Data
Sources: | . Visitor camping/day use permits.
. Boat and helicopter reports on park visitors carried.
. Periodic field counts of visitors.
. Periodic field check on visitor permits. |
| Adequacy
of Data | . Actual periodic field counts of visitors and checks on visitor permits are needed to verify compliance with permits and the accuracy of mail survey responses. |
| Tentative
Findings
(Based on
35% mail
survey
responses) | . The average actual visit period is slightly longer than indicated on permits.

. About a quarter of the visitor groups contain fewer or more people than stated on the permit but the average number is only slightly larger.

. Visitors will probably be difficult to control once they reach the park so initial control before entering the park may be most effective. Variations in use and numbers of users average out so strict enforcement may not be warranted at this time. Monitoring should be continued.

. There is a large variation in the camping location actually used to the assigned camping area on permits for those destined for Kalalau Valley.

. Some visitors indicate a lack of permit enforcement except during July and August. |

Information
Sought

Means of Access

Reason for
Data

- . Determine need for parking facilities at Haena for Na Pali Coast hikers.
- . Determine the need for commercial access by inflatable boats and helicopters.

Data
Sources

- . Visitor permits.
- . Permittee sample mail surveys.
- . Na Pali Zodiac records as requested in Special Use Permit.
- . Helicopter records - (To be requested in the future as part of a lease.)

Adequacy
of Data

- . Permittee mail surveys and commercial operator records should be compared to sample field counts or permit checks. A nonresponse rate of 65% in mail surveys allows a large sampling error.
- . Impact of helicopter access for day use and camping could not be determined.

Tentative
Finding:

- . Desired carrying capacity at Kalalau reached without commercial access. Therefore commercial boats and helicopters are not needed except as a convenience.
- . Nualolo Kai and Milolii were apparently under-used in 1979 when commercial access was limited to boat landings at Nualolo Kai. Commercial access seems justified.
- . There is a demand for secure, overnight parking area for Kalalau Trail hikers according to mail survey responses. A shuttle bus is also desired.
- . Mail surveys indicate a strong dislike of helicopters by about 1/3 of the Kalalau campers and a similar but lesser dislike of inflatable boats.

Information
Sought

Visitor Satisfaction

- | Information Sought | Visitor Satisfaction |
|--------------------|--|
| Reason for Data | <ul style="list-style-type: none">• Improve visitor satisfaction whenever possible by assessing the quality of the visitors experience and identifying the more frequently identified concerns expressed. |
| Data Sources | <ul style="list-style-type: none">• Letters/calls of complaint/compliments.• Amount of vandalism and number of violations of regulations.• Permittee sample mail surveys. |
| Adequacy of Data | <ul style="list-style-type: none">• Visitor satisfaction is subjective but comments can serve as indicators.• Permittee survey responses are a satisfactory source of data and can be supplemented by other sources. It cannot be assumed the 65% who did not respond would agree with the respondents. |
| Tentative Finding | <ul style="list-style-type: none">• See table ____• See comments reflect a lack of understanding of what to expect. Improved public information could reduce this problem. |

Information
Sought

Visitor Health and Safety

- | | |
|---------------------|--|
| Reason
Data | <ul style="list-style-type: none">. Determine the kinds and severity of hazards.. Determine the adequacy of emergency services.. Determine the adequacy/need for information warning the public.. Determine the condition of hikers on the Kalalau Trail. |
| Data
Sources | <ul style="list-style-type: none">. Field Reports.. Permittee survey responses. |
| Adequacy
of Data | <ul style="list-style-type: none">. Need reports from field. |
| Conclusion | <ul style="list-style-type: none">. |

GEORGE A. ARIVOSH
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 881
HONOLULU, HAWAII 96808

DIVISIONS:
CONSERVATION
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Permit Number

Dear Na Pali Coast Visitor,

We need the help of recent Na Pali Coast visitors in establishing a management program for the public use of this increasingly popular scenic, wild area. The State Parks Division has been given the job of protecting the natural and archaeological features of the area while allowing public enjoyment of a wildland experience with a minimum of modern conveniences and intrusions. As a recent permittee, we would appreciate your response to the following questions plus any thoughts you have on how we might improve your experience.

I. Permit Arrangements

- Did you visit the Na Pali Coast as planned? Yes No
How did you obtain your permit? By mail Over the counter
How far in advance did you receive your permit prior to your scheduled visit?
 Same day 2-5 days prior
 1-2 weeks prior More than 2 weeks prior
Did you obtain a permit for the location of your first choice? Yes No
Did you obtain a permit for the time period of your first choice? Yes No

II. Means of Access

- How did your group travel along the Na Pali Coast?
Hike One way Both ways
Charter boat " " " "
Private boat " " " "
Helicopter " " " "
For hikers only--How did your group travel to and/or from the trail head at the end of the road at Haena?
 Hitch hiked Drove car and parked
 Dropped off by friend Other

III. Visit Information

- How many nights did your group stay? _____ Nights
If your group stayed fewer/more days than planned, please indicate why.

Please indicate the number of nights that your group camped in each area.

____ Hanakapiai ____ Kalalau ____ Nualolo Kai
____ Hanakoa ____ Milolii

How many people were in your group? _____ Number of people

What recreational activities did your group participate in?

Hiking Sunbathing Hunting Other _____
 Swimming Nature study Fishing

How did you learn of the Na Pali Coast?

Is there any information/advice your group could offer others preparing to visit the Na Pali Coast?

Why did you visit the Na Pali Coast?

What likes or dislikes do you have about your Na Pali Coast visit?

Do you plan to visit the Na Pali Coast again? Yes No Unsure

After completing this questionnaire, please refold and return to the Department of Land and Natural Resources. Kindly return the completed questionnaire by March 31, 1980.

Thank you for your cooperation and prompt response.

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APPENDIX B

Section 2.
SUMMARY OF PROJECT RESULTS: *
RESOURCES MANAGEMENT

OBJECTIVE 1. RESOURCES INVENTORY

Archaeological reconnaissance survey of the Na Pali Coast State Park substantiated previous references to extensive Hawaiian development of this rugged environment. A total of 106 sites (in addition to 24 previously described ones) were identified in this survey. They represent a variety of Hawaiian activities and suggest a history of occupation dating back more than 700 years.

Irrigation agricultural systems are by far the most common archaeological sites on the Na Pali coast and represent one of the major subsistence activities (fishing probably being the other major endeavor) of the Hawaiian inhabitants of these valleys. Ground slope and the availability of manageable water appear to be primary concerns in the location of these wet agricultural systems. In the smaller valleys, such as Hanakoa and Awa'awapuhi, easily cultivable land is minimal; steeper slopes were developed for agriculture at an apparently higher expenditure of labor. In all valleys, agricultural fields are concentrated in the wider sections, i.e. usually in the makai portions, of the valley floors.

The main streams appear to have been difficult to control and thus, branch streams were apparently the principle sources of irrigation water. In valleys like Hanakoa, where there are few tributaries, 'auwai, tapping water off the main stream, were constructed as artificial feeder streams.

Although archaeological remains substantiate irrigation as the principal agricultural practice, historical references are made to dry land cultivation. Closer examination of the talus slopes above irrigation fields is needed to identify kula features and to define the relationship between the two agricultural forms. These areas were generally outside the boundaries of this project.

Habitation sites were difficult to identify. Most were platforms or pavings which were often associated with agricultural fields. This is described as the typical relationship in early 20th century Kalalau (Pa, in Emory 1949: 10). In several irrigation systems, terraces located at the base of talus slopes and above irrigation channels could have served as habitation sites; further work would be necessary to define their function. There is a conspicuous absence of habitation-type enclosures in the study area. Only two were noted in Kalalau (both were in unmapped site areas) and one each in Nu'alolo 'Aina and Nu'alolo Kai.

*Source: An Archaeological Reconnaissance Survey:
Na Pali Coast State Park
Island of Kauai

By Myra Jean F. Tomonari-Tuggle Sept. 1979

Heiau were located or have been historically recorded in all of the ahupua'a in the study area. However, they appear to concentrate in the southern end of the coast. Those located in Hanakapi'ai and Hanakoa have been only tentatively identified as religious sites on the basis of structural characteristics. Further south, 12 heiau have been either historically referred to (such as the fishing shrine at Pohakuao and the small heiau on Honopu Beach) or archaeologically described (as with Bennett's sites).

A summary of the historical and archaeological data is presented in Section 4. Site descriptions are in Section 5.

OBJECTIVE 2. ASSESSMENT OF IMPACT

The isolated and wild character of Na Pali is threatened by an increasing flow of hikers, campers, hunters, and tourists to the area. These transients, as well as feral animals, are endangering the fragile environmental resources in the State Park. One of the objectives of this project is to assess the effects of visitor access and of feral animal populations on the archaeological resources.

The primary forms of human-related impact are the digging of holes for firepits, garbage disposal, and outhouses, and the removal of stones from archaeological features for campfires and tent sites; the disturbance to surface structures by trail use and hiking is secondary. Feral animals were thought to be a problem, but they do not appear to have a substantial effect on site preservation or deterioration.

Damage resulting from natural causes such as erosion are not pertinent to the human-impact orientation of this study. It should be noted, however, that stream erosion is a major cause of site deterioration in many areas, notably Awa'awapuhi and Nu'alolo Valleys and at Nu'alolo Kai.

Impact evaluations are based on intensity of use as outlined in the "Na Pali Coast Interim Management Plan, Draft No. 5":

- 1) high impact; intensive use of area; restricted primarily to campgrounds in Hanakapi'ai, Hanakoa, and Kalalau;
- 2) moderate impact; areas frequented by park users but not on a continuous or destructive basis; primarily along the established State Parks trails and at Nu'alolo Kai and on Miloli'i Flats;
- 3) low impact; less frequented areas; off the established trails in the valleys from Hanakapi'ai to Kalalau, in the valleys of Honopu, Awa'awapuhi, Nu'alolo 'Aina, and Miloli'i, and in the high talus areas at Nu'alolo Kai and Miloli'i Flat.

Assessing Significance:

A corollary to the assessment of impact is the assessment of significance; both must be taken into consideration in recommendations for the management of cultural resources in the State Park. Significance is the archaeologically-based assessment of site value.

It has been noted that "the outstanding quality of significance is its relativity: the significance of something can only be interpreted relative to some frame of reference (Schiffer and Gumerman 1977: 239)." In assessing the significance of sites in the Na Pali Coast State Park, two frames of reference have been used: type of site and type of significance attributed to that site.

Type of site refers to site function, which is interpreted on the basis of excavation in similar structures in other areas and on descriptions in the ethnohistoric and ethnographic literature. For this report, sites have been organized into five broad categories: agricultural, habitation, special function (including heiau and burials), multiple function (complexes), and sites of unknown function. It should be made obvious that statements of significance based on surface survey information are always evaluations of potential significance. Site function may be redefined after further mapping and/or excavation; a reevaluation of significance should follow.

The type of significance, such as research potential, cultural import, and public value, is the other frame of reference. King et al (1977: 99-100) suggest that two basic questions be asked in evaluating the research potential of an archaeological site:

- 1) are there specific research topics which can be addressed, and,
- 2) does the site appear important enough to preserve for future research when new theoretical and/or methodological approaches may be developed.

Criteria for addressing these questions include the uniqueness of a site in relation to associated features or archaeological areas, availability of supplementary historic information, the condition of the site, and the kind of information retrievable.

Cultural value is a more subtle factor. The increasing awareness of indigenous groups to their cultural heritage places great import on this type of significance, especially when dealing with archaeological sites of religious, mythological, social, or historical importance. But it is not limited to only descendent groups. Archaeology is an expression of multi-cultural heritage and as prehistory (or history) retains intrinsic value for the society at large.

Public significance is related to the "use of archaeological sites to educate the public about the past and the ways it is studied; the use of research findings to enrich our present existence; the use of archaeological information by industry for practical applications; the use of objects, ruins, and stabilized or restored structures for public exhibit and enjoyment; and benefits to the local economy that result from tourism attracted by archaeological exhibits (Moratto 1975: 6-7)."

Archaeological Significance of the Na Pali Coast:

A theme of Hawaiian settlement and adaptation to variations in the general windward valley and coast environment provides a context within which individual archaeological sites are evaluated. Statements of significance can be applied at different culturally defined levels, i.e. the site, the valley, the ahupua'a, the district. The importance of individual sites is dependent on how well they represent or help to explicate the significance of the larger cultural unit in regard to the question of adaptation.

The agricultural sites identified in this survey are merely fragments of larger systems, generally the valley or the ahupua'a. Significance evaluations then vary, dependent on a multiplicity of criteria. The research potential lies in the distribution and patterning of these fragments within the system, in their relationship to natural elements such as terrain, water, and slope, and in comparisons of the systems in different valleys or ahupua'a. For example, site KAL-1, while not unique as a site, provides a context for research:

- 1) available land use data from the 1850's provides a baseline date for the site, and associates it by ownership with another agricultural system (KAL-12);
- 2) the use described in the land grant (olona cultivation) is incongruous with the initial interpretation of site function based on surface features which suggest irrigation fields for taro cultivation;
- 3) excavation to test for the technology of olona cultivation would not conflict with the preservation of the larger portion of the site;
- 4) the site is in excellent condition.

In general, agricultural sites have little ethnic significance; they offer little to heighten cultural awareness unless they are impressive in their complexity, size, and construction. Site HNK-5 is an example where significance could be defined by the engineering ability (evident in the patterning and construction of the agricultural fields on the steep valley slopes) of the aboriginal Hawaiians.

The Hawaiians were farmers and the agricultural systems that were a critical part of their life ways are often overshadowed in the public mind by sites such as heiau. It would seem that the near ubiquity of agricultural fields is contrary to the mental set of significance; any one fragment of the valley or ahupua'a-wide system could be adequate for the purposes outlined under public significance.

As in the case of the agricultural systems, the distribution of habitation sites is important in discussing the question of Hawaiian settlement and adaptation. But, in contrast, house sites are significant as individual features. Each is the physical remnant of a social unit and the kind of information retrieveable (for example, dietary residue and dateable material) provides interpretations of Hawaiian lifestyles, as well as of Hawaiian prehistory. Cultural worth and public value of habitation sites are related; interest in how, when, and where people lived apparently holds more attraction than particulars of taro cultivation. The relative uniqueness of house sites is also a factor. All habitation sites located in this survey are considered high significance.

Special function sites include heiau and burial sites, and while research potential is usually low, they are considered high significance on the basis of cultural and public value.

Complexes, i.e. those sites with more than one type of feature, are most important in terms of research potential. They represent the interaction of different spheres of Hawaiian life within a contiguous, and therefore temporally and spatially relateable, area. The specifics of research potential and cultural and public value are dependent on the types of features within the complex.

Sites of undetermined function are generally isolated features, such as retaining walls or terraces, which lack a distinct archaeological context. Generalizations about significance are difficult; therefore, sites will be dealt with on an individual basis.

Sites are rated as having low, moderate, or high significance (Table 1), on the basis of the criteria outlined above.

OBJECTIVE 3. RECOMMENDATIONS

The specific reasons for park development near the beach, near available water, and on level ground may be different from the Hawaiian concept of land utilization but the basic rationale is similar. The Hawaiians used areas that were easily manageable and accessible; the situation is no different today. The goal of conservation archaeology is the preservation of cultural resources, which is not incompatible with the recreation use of the State Park, especially in this situation of wilderness area management. Only areas that are being intensively used

Table 1. ASSESSMENT OF ARCHAEOLOGICAL SITES, WITH RECOMMENDATIONS FOR MITIGATION (Note text for key to recommendations).

SITE NO.	TYPE*	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
HKP-1	H	Poor	High	High	III
HKP-2	H	Good	Low	High	III
HKP-3	H/A	Poor	High	High	II
HKP-4	H	Fair	High	High	II
HKP-5	H	Poor	High	High	III
HKP-6	H	Good	High	Mod	V
HKP-7	A	Exce	Mod	Mod	V
HKP-8	A	Good	High	Mod	V
HKP-9	A	Exce	Mod	Mod	V
HKP-10	A	Poor	Low	Mod	V
HKP-11	S	Exce	High	Low	V
HKP-12	A	Exce	Mod	Mod	V
HKP-13	A	Good	Mod	Mod	V
HKP-14	H/A	Fair	High	Mod	V
HKP-15	S	Good	High	Mod	V
HKP-16	A	Fair	Low	Low	V
HKP-17	A	Exce	Mod	Mod	V
HKP-18	H	Exce	High	Mod	I
HKP-19	H/A	Exce	High	Mod	V
HKP-20	A	Poor	Low	Mod	V
HKP-21	A	Exce	Mod	Low	V
WAI-1	A	Exce	Mod	Mod	V
WAI-2	H	Good	Low	Low	V
HNK-1	H	Fair	High	Mod	V
HNK-2	A	Good	High	Mod	V
HNK-3	H	Good	High	Mod	V
HNK-4	H/A	Fair	High	Mod	IV
HNK-5	A	Good	High	Mod	IV
HNK-6	A	Good	High	Mod	IV
HNK-7	H/A	Exce	High	Low	V

*Type of site:

H = habitation
A = agricultural
S = special function
U = unknown

Na Pali Coast State Park
Table 1. Site Assessment

-b-

SITE NO.	TYPE	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
HNK-8	S	Exce	High	Low	V
HNK-9	H or S	Good	High	Mod	V
POH-1	A	Fair	Mod	Mod	V
POH-2	A or H	Fair	Mod	Low	V
POH-3	A	Fair	Mod	Mod	V
POH-4	H	Fair	High	Low	V
POH-5	A	Fair	Mod	Mod	V
KAL-1	A	Good	High	Mod	IV
KAL-2	A	Good	Mod	Mod	V
KAL-3	H	Poor	High	High	II
KAL-4	H	Poor	Mod	High	V
KAL-5	H/A	Fair	High	Mod	IV
KAL-6	H/A	Poor	High	Low	V
KAL-7	H/A	Fair	High	Low	V
KAL-8	A	Good	Mod	Low	V
KAL-9	A	Good	Mod	Mod	V
KAL-10	A	Poor	Low	Mod	V
KAL-11	A	Fair	Low	Mod	V
KAL-12	H/A	Good	High	Mod	IV
KAL-13	A	Good	Mod	Mod	V
KAL-14	A	Fair	Low	Mod	V
KAL-15	U	Fair	Low	Mod	V
KAL-16	U	Poor	Low	Mod	V
KAL-17	H/A	Fair	High	Mod	V
KAL-18	A	Good	High	Mod	V
HNP-1	A	Good	Mod	Low	V
HNP-2	A	Good	Mod	Low	V
HNP-3	A	Fair	Mod	Low	V
HNP-4	U	Fair	Mod	Low	V
HNP-5	U	Poor	Low	Low	V
HNP-6	U	Exce	High	Low	V
HNP-7	U	Fair	Low	Low	V
HNP-8	A	Fair	Mod	Low	V
AWA-1	A	Poor	High	Low	V
AWA-2	A	Poor	Low	Low	V

Na Pali Coast State Park
Table 1. Site Assessment

-c-

SITE NO.	TYPE	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
AWA-3	U	Poor	Low	Low	V
AWA-4	H/A	Good	High	Low	V
NUA-1	H/A	Poor	Mod	Low	V
NUA-2	H/A	Good	High	Low	V
NUA-3	H/A	Good	High	Low	V
NUA-4	H/A	Good	High	Low	V
NUA-5	S	Fair	High	Low	V
NUK-1	S	Exce	High	Mod	III
NUK-2	H	Good	High	Mod	III
NUK-3	U	Fair	Mod	Low	V
NUK-4	H	Fair	High	Low	V
NUK-5	H/S	Fair	High	Mod	V
NUK-6	H	Fair	High	Mod	V
NUK-7	H	Poor	Mod	Low	V
NUK-8	U	Poor	Low	Low	V
NUK-9	H	Good	High	Mod	V
NUK-10	H	Fair	High	Low	V
NUK-11	H	Poor	High	Low	V
MIL-1	A	Good	Mod	Mod	V
MIL-2	H?	Fair	Mod	Mod	V
MIL-3	A	Fair	Mod	Low	V
MIL-4	H	Good	High	Low	V
MIL-5	U	Exce	Low	Low	V
MIL-6	A	Good	Mod	Low	V
MIL-7	U	Poor	Low	Low	V
MIL-8	A	Good	Mod	Low	V
MIL-9	H	Good	High	Low	V
MIL-10	A	Exce	High	Low	V
MIL-11	S	Exce	High	Low	V
MIL-12	H	Fair	High	Low	V
MIL-13	U	Fair	Low	Low	V
MIL-14	U	Fair	Low	Low	V
MIL-15	U	Fair	Low	Low	V
MIL-16	H	Fair	High	Low	V
MIL-17	U	Fair	Low	Low	V

Na Pali Coast State Park
Table 1. Site Assessment

-d-

SITE NO.	TYPE	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
MIL-18	H	Poor	High		
MIL-19	H/A	Fair	High	Mod	V
MIL-20	H	Poor	High	Mod	V
MIL-21	H	Poor	High	Mod	V
MIL-22	H	Fair	High	Low	V
MIL-23	H	Good	High	Mod	V
3200-157	H/A	Renumbered			
3200-158	H/A	Renumbered			
3200-159	H/A/S	Renumbered			
3200-160	S	Fair	High		
3200-161	H	Unlocated	High	Mod	V
3200-162	H/A	Renumbered			
3200-163	A	Good	Mod	Low	V
3200-164	H/S	Unlocated	High	High	I
3200-165	S	Fair			
3200-166	H	Renumbered			
3200-167	A	Fair	Mod	High	III
3200-168	H	Unlocated			
3200-169	H	Unlocated			
3200-170	S	Fair	High	Low	V
3200-171	H/A	Unlocated			
3200-172	A	Unlocated			
3200-173	H/A	Unlocated			
3200-174	H	Unlocated			
3200-175	H/A/S	Unlocated			
3200-176	H/A	Unlocated			
3200-177	H	Unlocated			
3200-178	S	Unlocated			
3200-179	H/A	Unlocated			
3200-180	H/A	Good	High	Low	V
3200-181	H/A	Good	High	Low	V

CORRECTION

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

milou'lonas

Na Pali Coast State Park
Table 1. Site Assessment

-d-

SITE NO.	TYPE	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
MIL-18	H	Poor	High	Mod	V
MIL-19	H/A	Fair	High	Mod	V
MIL-20	H	Poor	High	Mod	V
MIL-21	H	Poor	High	Low	V
MIL-22	H	Fair	High	Mod	V
MIL-23	H	Good	High	Mod	V
3200-157	H/A	Renumbered			
3200-158	H/A	Renumbered			
3200-159	H/A/S	Renumbered			
3200-160	S	Fair	High	Mod	V
3200-161	H	Unlocated			
3200-162	H/A	Renumbered			
3200-163	A	Good	Mod	Low	V
3200-164	H/S	Unlocated			
3200-165	S	Fair	High	High	I
3200-166	H	Renumbered			
3200-167	A	Fair	Mod	High	III
3200-168	H	Unlocated			
3200-169	H	Unlocated			
3200-170	S	Fair	High	Low	V
3200-171	H/A	Unlocated			
3200-172	A	Unlocated			
3200-173	H/A	Unlocated			
3200-174	H	Unlocated			
3200-175	H/A/S	Unlocated			
3200-176	H/A	Unlocated			
3200-177	H	Unlocated			
3200-178	S	Unlocated			
3200-179	H/A	Unlocated			
3200-180	H/A	Good	High	Low	V
3200-181	H/A	Good	High	Low	V

Na Pali Coast State Park
Table 1. Site Assessment

-e-

SITE NO.	TYPE	CONDITION	SIGNIFICANCE	IMPACT	RECOMMENDATIONS
3200-182	H/A	Renumbered			
3200-183	S	Fair	High	Low	V
3200-184	A	Good	Mod	Low	V
3200-185	S	Unlocated			
3200-186	H/A	Fair	High	Low	V
3200-187	A	Poor	Mod	Low	V
3200-188	H	Fair	High	Low	V
3200-189	H	Fair	High	Low	V
3200-190	H	Fair	High	Low	V
3200-191	H	Good	High	Low	V
3200-192	H/A	Good	High	Low	V
3200-193	H/A	Poor	High	Low	V
3200-194	H/A	Exce	High	Low	V
3200-195	S	Poor	Low	Low	V
3200-196	H	Poor	High	Mod	V
3200-197	H	Fair	High	Mod	III
3200-198	S	Unlocated			
3200-199	S	Good	High	Mod	III
3200-200	H	Poor	High	Low	V
3200-201A	H	Unlocated			
3200-201B	H	Unlocated			
3200-201C	H	Unlocated			
3200-201D	S	Good	High	Mod	IV
3200-201E	A	Renumbered			
3200-201F	S	Fair	High	Low	V
3200-201G	S	Fair	High	Mod	IV
3200-201H	H	Fair	High	Low	V
3200-201I	H/S	Poor	High	Mod	V
3200-201J	H	Poor	High	Mod	IV

need immediate extreme mitigation. The presence of the archaeological sites as they are should enhance the wilderness experience and an appreciation for Hawaiian culture and prehistory. But both wilderness and archaeological resources are fragile and require constant monitoring. Their preservation depends on strict controls on visitor access and use.

Recommendations are made after evaluating the relationship between the nature and significance of the archaeological resources and the level of expected impact. Several alternative recommendations are available:

- 1) preservation: Efforts should be made to protect the integrity of archaeological sites by preservation through avoidance. In moderate or high impact areas, management plans could be modified to downgrade use levels, for example, shifting locations of campgrounds or moving trails to bypass significant sites. By doing so, and simultaneously reducing impact, salvage excavation, which is viewed as destructive to preservation, can be avoided. Modification of park plans is recommended for areas containing high significance/high impact sites, where restrictions on visitor use are feasible.
- 2) salvage, in two phases: The first phase involves instrument mapping and subsurface testing; the second involves excavation. Excavation in this sense refers to the retrieval of archaeological information prior to clearance for any future development or use. This recommendation is primarily for high significance/high impact areas where no other alternatives are available.
- 3) instrument mapping and subsurface testing: This involves limited excavation to determine the presence or absence of subsurface archaeological material and a reassessment of site significance. Recommendations for preservation, salvage, or clearance for use would follow the reevaluation. This alternative is primarily for selected high or moderate significance/high impact sites.
- 4) instrument mapping: The purpose of this recommendation is to record the spatial patterning of surface features. The result would be clearance for use, subject to maintenance of present levels of use; a change in level of use would require a reevaluation of the recommendation. This alternative applies primarily to moderate significance/moderate impact sites.

- 5) no immediate archaeological work necessary: This recommendation is for sites in areas where deterioration due to human causes is unlikely; sites can be left as they are, i.e. allowing vegetation to be natural protection against site deterioration by hiker and camper use. However, a reassessment of the recommendation is necessary if levels of use are modified. This recommendation is not a reflection of site significance. Clearing of sites for display purposes should be avoided.

Specific Recommendations:

One of the goals of this study is to delineate areas where more intensive work is needed for the preservation of cultural resources in the State Park. Recommendations I through IV are those deemed immediately necessary for the alleviation of impact on selected archaeological sites. Recommendations V through VII are more general recommendations for the long term management of archaeological resources in the State Park.

- I. Preservation, as defined above, is advised for the following sites:
- 1) Site HKP-19; impact can be alleviated by blocking off the secondary trail (off the valley loop trail) which crosses through most of the site area; the loop trail bypasses much of the site;
 - 2) Site 3200-165; impact can be alleviated by shifting the Ha'ena-Kalalau trail to the mauka and opposite side of the small knoll adjacent to this site, and thereby bypassing the site; there is an existing trail that could easily be expanded to accommodate the heavy hiker traffic away from this site.
- II. Two sites are recommended for salvage; both are primary camping areas in the State Park:
- 1) Site KAL-3 was identified in land grant data as consisting of taro fields with an associated house site, and it was apparently the site of the last frame house in Kalalau. Although it is now in extremely poor condition, the availability of historic information and the presence of the buried deposit (probably cultural) exposed in a gully bank add to its research possibilities. It is now one of the most heavily used camping areas on Kalalau Beach because of its proximity to Kolea waterfall. A shift in campground location does not appear feasible; therefore, the recommendation for salvage.

- 2) Sites HKP-3 and HKP-4 make up the campground area in Hanakapi'ai Valley and, like Site KAL-3, are in a poor state of preservation. Survey indicates the presence of house sites and agricultural fields. The combination of high significance, high impact, and absence of alternative camping areas justifies salvage as the mitigating action.

III. Instrument mapping and subsurface testing are recommended for the following sites:

- 1) the beach area at Hanakapi'ai Valley, which involves Sites HKP-1, 2, and 5; there is a possibility that these sites are of recent construction but observations by Bennett in 1931 of house platforms along the beach warrant a testing of the present features to determine if there are remnants of prehistoric occupation;
- 2) the campground on Kalalau Beach in the area noted as Site 3200-167; Bennett noted taro fields, an 'auwai, and possible habitation features; the high impact area is along the base of the talus slope and it is this part of the site which should be tested; mapping of the entire site should be carried out to determine the spatial patterning of the surface features;
- 3) the complex of features at the north end of Nu'alolo Kai; this includes Sites NUK-1 and 2 and 3200-197, 198, and 199; Site 196 has been excavated by the B.P. Bishop Museum; distribution of sites suggest a compound consisting of the heiau, burial area, and habitation features, encircled by a standing wall in the only level area of considerable size on Nu'alolo Kai; this recommendation is contingent on the granting of permission for helicopter landings and passenger dropoffs and the encouragement of camping at this locale; it is recommended that visitor use be discouraged, and if so, only instrument mapping is recommended;
- 4) the areas around the outhouses and rubbish pits in the Hanakapi'ai, Kalalau, Nu'alolo Kai, and Miloli'i campgrounds, where the excavation of these necessary maintenance features presents a special mitigation problem; it is recommended that testing be carried out in the vicinity of the present structures to determine the presence or absence of subsurface deposits; if deposits are found, testing should continue until an archaeologically sterile area is located; testing could be carried out by coring, with associated control pit excavations, and could be coordinated with maintenance needs, i.e. control excavations could later be used for maintenance purposes.

- IV. Instrument mapping is recommended for selected sites in moderate impact areas. They are:
- 1) Sites HNK-5 and HNK-6, which are the main campground areas in Hanakoa Valley; these areas were developed for wet taro cultivation and apparently later modified for coffee production; instrument mapping should provide an idea of the spatial distribution of the agricultural systems;
 - 2) Sites KAL-1 and KAL-12, which are agricultural fields related through 1856 land grant information; instrument mapping should provide valuable comparative data;
 - 3) Site KAL-5, which are house sites and agricultural fields at the mouth of Kalalau Valley; an outhouse, rubbish pit, and trail junction are in the area;
 - 4) Site 3200-201D, which is a grouping of mound burials located behind the State Parks cabin at Miloli'i;
 - 5) Sites 3200-201G and J, which are high significance sites located at the mouth of Miloli'i Valley; a record of their surface configurations would be beneficial as they have been modified by recent users.
- V. No immediate mitigation action is necessary for other sites located in this survey.
- VI. Continued park use may alter the present evaluations of impact; it is therefore further recommended that a program of periodic monitoring be established to assess the long term impact of visitor use on cultural resources;
- VII. In conjunction with monitoring, further reconnaissance survey of low impact areas should be carried out to provide a context for the archaeological remains thus far evaluated, i.e. to inventory and map the full range of cultural resources, as a means to clarify and substantiate statements of significance. A full evaluation of significance depends on broader and more detailed archaeological work than has been carried out to date. continued reconnaissance

APPENDIX C

HAWAIIAN STATE PARKS
JUL 17 3 29 AM '79

A Botanical Reconnaissance of Kalalau, Honopu, Awaawapuhi,
Nualolo, and Milolii Valleys and Shorelines--Na Pali, Kauai

by

Carolyn Corn, Gar Clarke, Linda Cuddihy and Layne Yoshida

The Na Pali Coast encompasses the coastline and valleys stretching from Kee Beach southwest to Polihale, a distance of approximately 15 miles. The terrain is marked by precipitous valleys, many with running streams and lush vegetation. The coastline is rich in natural beauty and history, and provides for such recreational activities as hiking, fishing, swimming, diving, hunting and sightseeing.

Recently, the area has received greater pressure from the public for recreational use. This impact has caused State Parks to initiate a land management plan for public recreational use. The initial stage requires preliminary surveys of the archaeology, fauna and flora in preparation for further examination. The following information is the result of a botanical reconnaissance by four botanists (Hawaii Division of Forestry) from 16-20 July 1979 of five valleys (Kalalau, Honopu, Awaawapuhi, Nualolo and Milolii) and coastal areas (Honopu, Milolii and Nualolo Kai) as requested by State Parks.

Due to the constraints of time, the reconnaissance was limited to short cruises of each area. Where possible, each botanist surveyed different parts of the same valley paying close attention to the stream, talus slope and pali habitats. Survey techniques utilized a combination of hiking, binocular and camera skills, which together facilitated verification of vegetation species and communities. Binoculars proved invaluable in surveying the inaccessible portions of the valleys, and the camera aided in recording vegetation communities. Data collection included recording vegetation types present, unique botanical observations, and collections of plant species of questionable identity.

Survey time for each area was: Kalalau Valley - 1 day; Honopu Valley - 1 day; Nualolo Aina - 1 day; Awaawapuhi Valley - 3 hours; Milolii Valley - 3 hours; Honopu Beach - 1 hour; Nualolo Kai - 2 hours; and Milolii Beach - 2 hours. Kalalau Valley, due to its substantial size and thick vegetation, was not adequately examined during this survey in comparison to the other areas observed. Lack of time and topography hampered a complete reconnaissance of all areas, thus some elements of the flora may have been overlooked.

BOTANICAL ASSESSMENT

Accessibility, rugged terrain and vegetation in valleys along the Na Pali Coast render ground travel very difficult and will hinder survey efforts. Each coastal segment and valley differs in the amount and degree of its topographic relief; however, these encumbrances can be minimized when conducting a plant survey (or inventory) by using qualified personnel and allowing additional man hours and helicopter time.

OBJECTIVE #1 - Estimate of time and manpower necessary to prepare a botanical listing of plants.

Estimated field survey time needed to provide a comprehensive plant inventory for the eight specified locations is 1008 man hours utilizing qualified botanists. Estimated times for each area are given below. (A minimum of 2 to 3 botanists would be advisable for safety reasons.) This inventory should be conducted in early spring (March-May) when the plants are often blooming and annual grasses are not yet dried out. For every hour of field work, 1 to 3 hours is needed to identify unknown plants and compile the final report. Therefore, the total man hours for the complete project is approximately 3000.

ESTIMATED FIELD TIME

<u>LOCATION</u>	<u>MAN HOURS</u>	<u>HELICOPTER (HRS)</u>
1. Kalalau Valley	448	2-1/2
2. Honopu Valley	96	1/2
3. Awaawapuhi Valley	64	1/2
4. Nualolo Aina Valley	128	1
5. Milolii Valley	96	1/2
6. Honopu Beach	48	1/2
7. Nualolo Kai	64	1/2
8. Milolii Beach	64	1
TOTAL	1008	7

The total number of helicopter hours is computed as 12 hours--7 hours for actual work time and 5 hours ferry time. The estimated number of helicopter work hours for each area is given above. This support is necessary to identify and record the distribution of threatened and endangered plants along inaccessible cliffs. It entails good communication between the botanist(s) and pilot to observe small herbs growing along the cliff faces with brief pauses or stops on isolated platforms.

Some adjustments to the above man hour figures can be made if the helicopter is utilized to drop personnel at remote sites within each valley or coastal area. For example, in a valley as large as Kalalau, botanists could be dropped by helicopter at strategic locations to survey a planned area. This would decrease the man hours but would incur additional helicopter costs.

Since the Na Pali plan includes other valleys from Polihale to Haena, extra survey and helicopter time would need to be added for these locations.

A botanist who is willing to scale cliffs using ropes to unique plants seen by helicopter, would prove invaluable to the survey. Also there is a need for a firearm to shoot off branches of plants growing on cliff faces for their positive identification. (Several uncollected rare plants, which may turn out to be new species, were seen in this reconnaissance on sheer cliffs but due to their inaccessibility could not be collected.)

A good botanical survey should include the following items:

1. A complete plant checklist (family, genus, species, variety, author, common name, location and status of each taxon).
2. Vegetation description of each area to depict the spatial limits of various plant communities.
3. Range and frequency of rare, threatened or endangered plants.
4. Judicious collection of specimens for taxonomic verification of potentially endangered plants.

OBJECTIVE #2 - List areas harboring largely exotic vegetation, sensitive areas where native threatened or endangered plants are likely to occur and areas where direct impact upon native plants will likely occur.

Former land occupancy by the Hawaiians combined with recent goat grazing, has resulted in the occurrence of a high proportion of weeds and exotic grasses in and along accessible valleys and beaches. Since rare Hawaiian plants often do not occur in areas where the ground is densely covered by exotic plants, the valley floors have little potential of harboring rare native plants. Only on steeper coastal and valley cliffs and Honopu Beach have a number of native species been able to survive. Among these native species, there are a number of rare plants. Many of these are listed as endangered and threatened on the 1975 Federal Register.

Areas where goats cannot or do not graze can be considered sensitive areas where native threatened and endangered plants are likely to occur. For example, Hedyotis st. johnii appears on rocky cliffs within the salt spray zone. Other species such as Hibiscus Saintjohnianus and Cyrtandra sp., occur along rocky cliffs near waterfalls at the back of the valleys where more moisture may be present. A native kookoolau (Bidens sp.) that is present on steep cliffs where goats cannot reach it, is growing inside a goat enclosure on relatively level land. This suggests that the plant is vulnerable to grazing but survives among exotics within the enclosure. Along the cliffs of Kalalau, remnant koa and dry forests exist in isolated pockets. Here on slopes greater than 40-50 degrees, seven trees of the endangered Kokia kauaiensis were seen in flower.

A particularly vulnerable area where endangered plants are located is Honopu Beach. Due to its size, limited sea access, and isolation by high cliffs, the beach has escaped being overrun by exotic species. However, some aggressive plants are becoming established which may lead to the extinction of rare natives, such as 'anaunau (Lepidium o-waihiensis), unless these exotics are controlled.

The areas where direct impact upon native plants will likely occur are: Honopu Beach, Milolii Beach and Kalalau Beach. The proposed park activities, if limited to the sites described in the interim plan, should have little or no direct impact upon rare and endangered plants; however, the indirect impact could be devastating.

OBJECTIVE #3 - List probable threats to native plants with proposed park development.

Threats to the native plants along the Na Pali Coast may be divided into four major categories: people, feral animals, exotic plants and fire. All of these are inseparable and constitute some difficult trade-offs from a management perspective.

As previously stated, the vegetation of the valleys and coastal areas surveyed, excluding the cliff faces, is dominated primarily by exotics with the exception of scattered pockets of remnant native flora. All of the above threatening categories may adversely affect these habitats.

The cliff habitat above the valley and coastal talus slopes hosts a high proportion of native plants, some rare and endangered. Possible threats to the native vegetation on these cliffs are negligible from direct impact by people or feral animals but these areas are susceptible to fire and displacement by exotic plants.

People - The impact of "well controlled" numbers of people as listed in the Na Pali Coast Interim Management Plan probably will have little direct impact upon native plants; however, the indirect affects, such as the introduction of new exotics (intentional or unintentional) and uncontrolled fires, can have an impressive impact that could lead to extinction of a number of plants or species.

Feral Animals - The native flora in the locations surveyed has suffered a great amount of damage from feral ungulates, both cattle (now removed) and goats. This grazing pressure is probably largely responsible for the altered condition of the native plant communities today, including accelerated erosion, exotic plant encroachment, limited seedling development and habitat reduction. Though the area's holding capacity for feral animals may not be fully realized today, the damage goats have perpetuated in the area is evident.

The talus slopes comprise the largest land type in many of the valleys; these seem to be preferred by the goats. The slopes are quite steep and marked by bare spots, earth slumps and goat trails. The browse line is low and there is practically no reproduction of native plants on these slopes.

Noteworthy is the greater diversity of rarer native plants along the valley walls and cliff faces above the talus slopes. Whether this phenomenon is the direct result of goat pressure limiting native plant growth to the cliff walls or other influences, is an unanswered question. However, the fact remains that the major range of rare and endangered plants observed in this botanical reconnaissance was confined chiefly to the cliff faces. Their inaccessibility limits any direct immediate threat to these particular plants by goats but the long-term indirect effects of grazing are as yet unknown.

Exotic Plants - Exotic plants constitute the bulk of vegetation cover in all valleys surveyed. In particular, lantana (Lantana camara) and koa-haole (Leucaena leucocephala) exhibit the capacity to form nearly homogeneous stands. Java plum (Eugenia cumini) is abundant in Kalalau and may become widespread in other valleys in the future. Several other exotic plants encountered in this survey do not presently represent a significant proportion of vegetation cover but are elsewhere considered problem exotics. These potential problem plants include blackberry (Rubus penetrans) and thimbleberry (Rubus rosaefolius) which are seen near streams in four valleys and are known elsewhere for their ability to form dense thorny thickets. A few banana poka (Passiflora mollissima) seedlings are in Nualolo and Awaawapuhi Valleys. (This plant has become a serious pest in some forests of the Island of Hawaii and in Kokee, Kauai with its habit of festooning trees and hampering photosynthesis.) A few patches of molasses grass (Melinis minutiflora) are present in three valleys. This grass is notable elsewhere for its ability to form dense, spreading mats. Many be-still trees (Thevetia peruviana) are growing in Kalalau Valley above the beach and along the valley trail. This species has been the cause of a number of serious poisonings in Hawaii, thus any further increase in its numbers within Kalalau is certainly undesirable. One banyan tree (probably Ficus microcarpa) observed near the beach at Nualolo Kai represents a possible source of bird-dispersed seed, although this species was not encountered elsewhere during the survey. Lastly, one patch of kakalaioa, probably the indigenous Caesalpinia major, is present in Milolii Valley where it reportedly has formed thorny thickets in the past.

Fire - Fire poses a serious threat to the native flora on this dry coastline. Prevailing winds compound the problem as they would spot fires both toward the valley head and down the coastline or over the valley ridge toward Polihale. The likely fire source would be near the coastal areas (human element) giving the burn ample fuel to move inland within some valleys. One compensatory feature of the coast is the sheer ruggedness of the valleys exemplified by knife ridges and steep cliff faces which could aid in confining a burn to a single valley.

Fire is an immediate threat to the rare and endangered native plants on Honopu Beach, Milolii Beach and the cliff faces of the coast and valleys. Although these grow from the cliff faces, there is enough dry fuel (depending on moisture regimes) to destroy these plants.

Of the coastal areas investigated, Honopu appears to be the most sensitive and fragile. Despite its diminutive size as compared to Kalalau, a large proportion of the vegetation is composed of indigenous plants, several of which are not

established on the other sandy beaches surveyed. Increased human usage of the beach could well result in the loss of these interesting components of dune vegetation. Plant reduction due to helicopter landing or excessive numbers of people scrambling over dunes might conceivably result in greater loss of sand during the winter months. Camping is probably not desirable as this would increase the chance of a devastating fire, the trampling of rare plants, and might lead to the introduction of exotic plants. Aggressive exotics such as lantana (Lantana camara), koa-haole (Leucaena leucocephala) and Java plum (Eugenia cumini) are present at Honopu Beach at manageable levels; further encroachment of these plants should be monitored in the future.

RECOMMENDATIONS

In the context of rare and endangered plants, it is recommended that protection be extended to those endemic plants growing on the cliff walls both in the valley and along the coast as well as those on Honopu Beach. For the remaining habitats, consisting of remnant native plant systems and exotics, measures should be taken to preserve and possibly improve the vegetative vigor of these areas. The following is a list of recommendations which may aid land managers in preserving the flora of the Na Pali Coast.

People:

Holding capacities and land use should be systematically monitored and based on the ability of a valley and coast to withstand erosion and deterioration of the vegetation from the human element.

Herbicides:

Should not be used without special care to avoid sensitive localities where endangered plants are likely to occur. Methods of application should minimize spray drift, since a number of plants occur along trails where maintenance is necessary.

Trail Maintenance:

Particularly on steep cliffs, endangered plants are likely to occur next to the trail. Care should be taken not to widen trails excessively which will cause damage to surrounding plants. Efforts to keep hikers along defined trails is needed to prevent erosion and degradation to the surrounding plant life.

Helicopters:

Existing and proposed helipads were botanized and found clear of rare and endangered native plants. This provision should also be considered for future helipads. As stated in the Interim Management Plan, the provision to prohibit landings in some areas, especially in Honopu, and limit their landings to specified locations, is satisfactory from the standpoint of vegetation damage. Helicopter entry should also be limited to specific valleys, as blade wash and the possibility of a crash and resultant fire would threaten plant life.

Boats:

Provisions set forth in the Interim Management Plan are satisfactory provided landings are limited to areas free of vegetation.

Goats:

The impact of goats on native plants of the Na Pali Coast should be studied further by establishing additional exclosures in diverse habitats. Exotic plant aggression, goat removal techniques, fire threat, and native plant establishment should be considered during the monitoring. To limit the degree of plant destruction by goats, hunting should be opened to the public.

Fires:

To limit the threat of fire, campers should be made aware of the dangers (fuel, blind valleys and wind) and campfires should be discouraged.

Exotics:

As described previously, some exotic plants were found to be very aggressive with the potential to cause deleterious damage to the native vegetation. These plants should be managed and controlled. Consideration should be given to erosion if removal is planned.

Plant Introductions:

Intentional (and unintentional) plant introductions should be monitored and controlled to prevent their escape and spread. Care should be taken to introduce only those plants that will not become wide-spread.

Special Area:

Due to the number of native and rare species on Honopu Beach, it is recommended that this area be kept in its native form with control of all exotic plants. Periodic weed control overseen by someone familiar with rare plants is needed to prevent decimation of these important species. (Please no herbicides.) The number of people entering the habitat should be carefully monitored with only sea landings allowed.

DRAFT

A BOTANICAL RECONNAISSANCE OF THE NA PALI
COAST TRAIL: KEE BEACH TO KALALAU VALLEY
(April 9-11, 1980)

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Dept. of Land and Natural Resources
Hilo, Hawaii

C-10

INTRODUCTION

On April 9, 10 and 11, 1980 the Endangered Plant Species Crew of the State Division of Forestry conducted a botanical reconnaissance of the Na Pali Coast from Kee Beach to Kalalau Valley, Kauai. Botanists on the survey included Dr. Carolyn Corn, Gar Clarke and Linda Cuddihy. This survey was requested by State Parks and is the second and final phase of a cooperative inventory of the natural resources found on the Na Pali Coast from Kee Beach to Milolii Valley. The first survey phase from Milolii Valley to Kalalau Valley was completed and submitted to State Parks on September 6, 1979.

State Parks requested that the following objectives for the botanical resource inventory be addressed:

1. Estimate the time and manpower necessary to prepare a botanical listing of plants found.
2. List areas harboring largely exotic vegetation, sensitive areas where native threatened or endangered plants are likely to occur, and areas where direct impact upon native plants will likely occur.
3. List probable threats to native plants with proposed park development.
4. Recommendations

The botanist crew was transported by helicopter to the eastern ridge above Kalalau Valley. Botanical surveillance was limited to the well traveled trail along the coast to Kee Beach and the spur trails to the falls of Hanakapiai and Hanakoa Valleys (Fig. 1). Survey time for the trail from Kalalau to Hanakoa, Hanakoa Valley, the trail from Hanakoa to Hanakapiai, and Hanakapiai Valley was approximately 1/2 day for each location. Hoolulu and Waiahuakua Valleys, although rich in native plants, were not penetrated due to limited time. The trail from Hanakapiai to Kee Beach was examined only briefly, with survey time amounting to 2-3 hours. The constraints of time and inclement weather limited reconnaissance of isolated areas where a higher probability of encountering rare plants exists.

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C-11

BOTANICAL ASSESSMENT

Objective #1 - Estimate the time and manpower necessary to prepare a botanical listing of plants found.

Due to the rugged and precipitous topography, an exhaustive botanical evaluation of the Na Pali Coast requires a combination of terrestrial, littoral, and aerial survey methods. Time estimations by locality for manpower, helicopter, and boat use to complete a botanical survey of the Na Pali Coast from Kee Beach to Kalalau Valley are listed in Table 1. Total estimated man-hours for the terrestrial survey are 512 hours, helicopter time totals 6 hours, and boat use is one day or 8 hours. The subdivision by areas shown below is based on coverage, accessibility and the distribution of largely native habitat. Compilation of the final report, which consists of plant identification, production of location maps, and write-up usually requires 1-3 additional hours per field man-hour, which would increase the total man-hours to over 1500 hours. The ground survey in conjunction with a small boat and a helicopter should provide the necessary coverage for an intensive field examination of the botanical resources.

The coastal region between Kee and Kalalau Beaches should not require more than one day of boat time, utilizing 2-3 botanists equipped for wet landings (tabis, waterproof paper, etc.) and remote observation of cliffs (binoculars, etc.). The boat would provide access to isolated hanging valleys and talus slopes. Inaccessible cliff areas should be scrutinized with high power binoculars. For safety reasons, this operation should be attempted in the late spring or summer months (May to September), as ocean conditions will be calmer and beaches more developed. However, optimum botanical conditions will exist in early spring (March to April) when plants are usually fertile and herbaceous cover vigorous. Thus a calm day in April could be selected for the shoreline survey.

The helicopter can be an invaluable tool depending on the extent of the ground survey and the availability of acceptable landing sites. Total helicopter time is estimated at 6 hours: 4 hours survey time and 2 hours ferry time (Table 1). Many of the ridge tops and pali areas are inaccessible from the trail. The helicopter would facilitate binocular observation and possibly land the botanists into isolated sites. Helicopter ground support is also important to the survey; botanical efficiency and data collection are hampered if full packs complete with plant presses and collected specimens must be carried between campsites. Prearranged helicopter pick-up times for equipment transport would expedite the situation.

Table 1: Estimation of Manpower and Equipment Needs

<u>Location</u>	<u>Survey Time (Man-Hours)</u>	<u>Helicopter (Hours)</u>	<u>Boat (Hours)</u>
Trail: Kalalau to Hanakoa	64	1	
Hanakoa Valley	96	1/2	
Waiahuakua Valley	96	1/2	
Hoolulu Valley	96	1/2	
Trail: Hoolulu to Hanakapiai	16	1/4	
Hanakapiai Valley	128	1	
Trail: Hanakapiai to Kee	<u>16</u>	<u>1/4</u>	<u> </u>
	512	4	8
		Ferry Time	
		<u>2</u>	
Total	512 Man-hours	6 Hours	8 Hours

Logical campsites are Hanakapiai, Waiahuakua, and Hanakoa Valleys. Acceptable landing sites exist in Hanakapiai and Hanakoa Valleys, but their presence in Waiahuakua Valley has not been ascertained.

Objective #2 - List areas harboring largely exotic vegetation, sensitive areas where threatened or endangered plants are likely to occur and areas where direct impact upon native plants will likely occur.

Exotic Vegetation

Although exotic plants are present throughout the area surveyed, certain portions of the Na Pali Coast have vegetation composed almost entirely of these introduced species. Excepting the sheer cliffs and several small hanging valleys, the trail between Kalalau and Hanakoa Valleys is an area of largely exotic vegetation, being dominated by introduced grasses, lantana (Lantana camara), sisal (Agave sisalana), and trees such as Java plum (Eugenia cumini), kukui (Aleurites moluccana), and guava (Psidium guajava). Two other localities with predominantly exotic vegetation are the floors of Hanakoa and Hanakapiai Valleys, which are dominated by introduced trees such as kukui, Java plum, coffee (Coffea arabica), guava, and mango (Mangifera indica).

Sensitive Areas

A number of areas exist along the Na Pali Coast which harbor proposed endangered plants (see Fig. 1). These sensitive areas include several hanging valleys on the trail between Kalalau and Hanakoa Valleys, the valley heads of Hanakoa and Hanakapiai, and the stretch of trail between Hanakoa and Hanakapiai Valleys. Perhaps the most botanically sensitive area occurs on the stretch of trail between Hanakoa and Hanakapiai Valleys, where Waiahuakua and Hoolulu Valleys constitute the bulk of the area. These two valleys are part of the 3160 acre proposed Hono O Na Pali Natural Area Reserve and include some of the most intact native plant habitats found during the course of this survey. Only the trail regions were briefly surveyed, but future penetration into these two valleys will probably reveal additional rare plants.

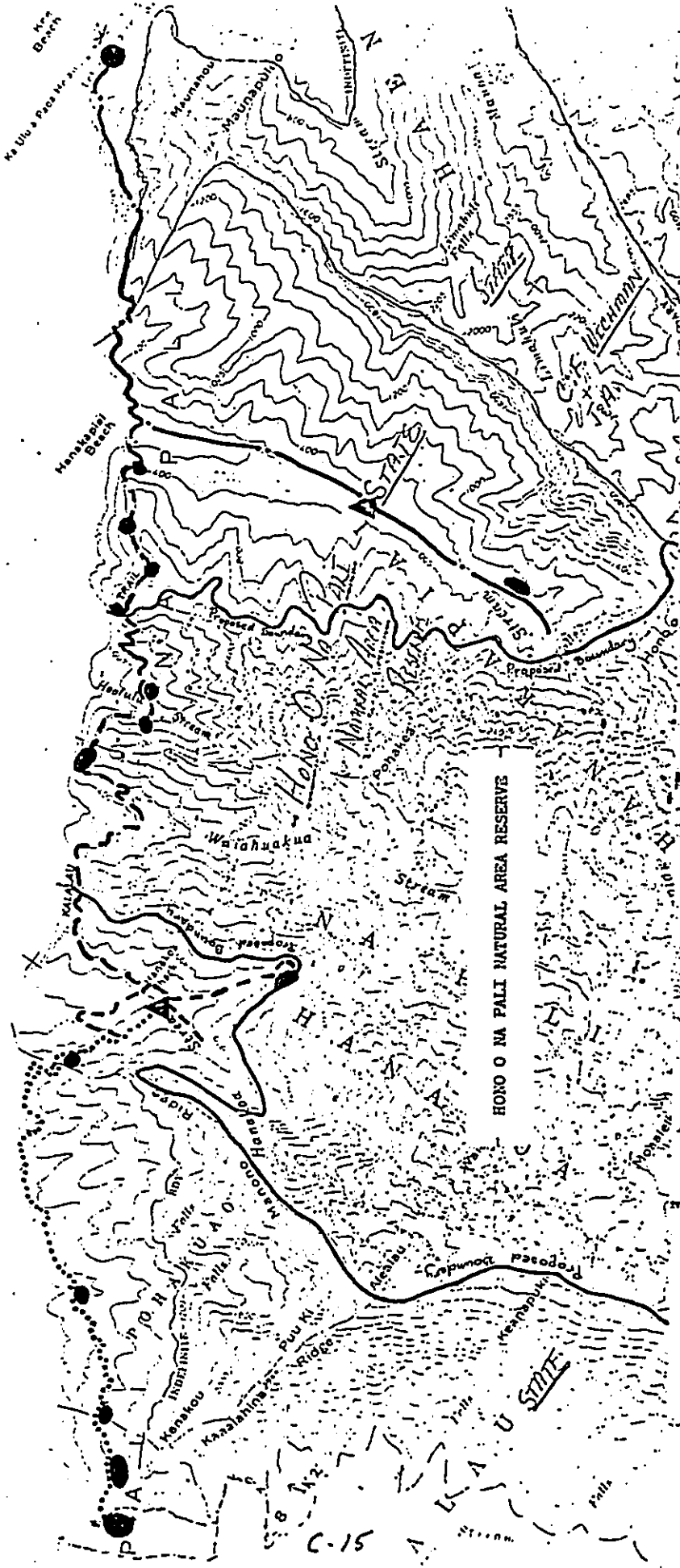
Ten proposed endangered species (Federal Register 1976) located during the course of this survey are listed below.

O C E A N

ure 1: NA PALI COAST, KAUAI: BOTANICAL SURVEY

- Survey Route
-Day 1 (4-9-80)
- Day 2 (4-10-80)
- Day 3 (4-11-80)
- Helicopter Drop Off ●
- Campsite ▲
- Survey End ●

Sensitive Areas:
(harboring rare plants)



1. Munroidendron racemosum (Forbes) Sherff var. racemosum, a tree of the ginseng family (Araliaceae) with no known Hawaiian name, is endemic to the island of Kauai. One individual was sighted growing with hala on the slope above the trail. A small tree with compound leaves covered with hairs, Munroidendron is difficult to distinguish from 'ohe (Tetraplasandra sp.) except during flowering and fruiting, when it is recognized by its pendent inflorescences.
2. Bidens napaliensis Sherff, ko'oko'olau, is endemic to Kauai. Less than 10 plants were seen growing along the trail at two locations. A herbaceous or woody plant to 4 feet tall, this member of the sunflower family (Compositae) is distinguished by leaves with only three leaflets and inflorescences with four to five yellow ray florets.
3. Lipochaeta alata Sherff var. alata, nehe, another member of the sunflower family (Compositae) endemic to Kauai, was seen in three areas. A number of these nehe plants were growing on the cliff face above the trail with other native plants, such as ko'oko'olau (Bidens sandvicensis), 'emo-loa (Eragrostis variabilis), and 'akoko (Euphorbia celastroides). A herbaceous plant with yellow inflorescences, this species may be recognized by the winged petioles of the leaves.
4. Canavalia napaliensis St. John or C. nualoloensis St. John, a vine of the pea family (Leguminosae) with no common name, was observed along the trail northeast of Kalalau, where it was hanging from guava and alahe'e trees. One vine, with ternately compound leaves silky hairy on the underside, was seen. Determination of the species of this plant is difficult as no flowers or fruit were present. However, it is one of the two above species--both are proposed endangered species endemic to Kauai.
5. Pleomele aurea (H. Mann) N. E. Br., halapepe, is listed in the Federal Register as endangered under the synonym Dracaena aurea. This member of the lily family (Liliaceae) is endemic to the Hawaiian Islands; its distribution is not limited to Kauai. During this survey, the halapepe was noted in three localities. A tree-like plant, the halapepe has long narrow leaves concentrated near the stem apex and round red to brown fruit borne in large pendant clusters.

6. Brighamia citrina (Forbes and Lydgate) St. John var. napaliensis St. John, alula, is a proposed endangered member of the Lobelia family (Lobeliaceae) endemic to northern Kauai. This unusual plant has a stem swollen at the base, topped by a rosette of cabbage-like leaves. The alula was noted in only one area where several individuals were growing on a very precipitous cliff face below the trail. The inaccessibility of this habitat admits the possibility of other individuals of the species occurring on other cliff faces below the trail.
7. Cyanea leptostegia Gray var. leptostegia, hahalua, is another species of the Lobelia family endemic to Kauai. This tall palmaeform plant has very long leaves and pendant crowded clusters of purplish red flowers. A solitary hahalua was sighted where it was growing among hala and ti plants on the slope above the trail. The presence of this plant along the Na Pali trail is unusual, as the species is of more frequent occurrence in the Kokee area.
8. Lobelia tortuosa Heller, ohawai, is a third proposed endangered lobelioid encountered during this survey. Also endemic to Kauai, a number of plants were seen in one locality. These small shrubs were growing on a dripping rock face within reach of the trail. Unfortunately these individuals were not flowering at the time of this survey, so the garnet red or magenta colored inflorescences were not observed.
9. Hibiscus saintjohnianus Roe, a member of the mallow family (Malvaceae) without a known Hawaiian name, is a small shrub endemic to Kauai. This red flowered hibiscus was observed in several locations growing on moist cliff faces.
10. Peucedanum kauaiense Hbd., makou, is a herbaceous plant with pinnate leaves and white flowers arranged in an umbellate inflorescence. A member of the carrot family (Umbelliferae), this species is endemic to Kauai and is listed as an endangered species. This rare makou was encountered in two places: a steep cliff below the trail and beside the trail west of the Hanakapiai. The few trailside plants could easily perish with any trail cleaning, widening, or heavy trail usage.

Notable Plants: Several other native plants seen during this survey, while not proposed endangered species, are of interest due to the paucity of their numbers or their limited distribution along the Na Pali Coast. The following species are listed in the same sequence as they were encountered along the trail. A few Schiedea plants are growing on the cliff face directly above the trail. This native plant was flowering, and a specimen was collected; however, it has not yet been identified to species.

In several hanging valleys northwest of Kalalau Valley, several Kauai sandalwoods (Santalum pyrularium) grow on rather dry exposed slopes beside the trail. These few small trees probably represent the lower limit of the range of this species, as it is more common at higher elevations. Another plant encountered in this area is a small 'ohe (Tetraplasandra sp.) tree, which was neither flowering or fruiting. A fourth notable species observed along this segment of the trail is succulent nehe (Lipochaeta succulenta var. Barclayi). At least fifty of these small herbaceous plants with bright yellow flowers were growing along the trail.

One endemic species seen in Hanakoa and Waiahuakua Valleys, ho'awa (Pittosporum napaliense), is of interest chiefly because of its restriction to the Na Pali Coast. A species of Cyrtandra, not yet identified, was encountered twice and may prove to be rare and/or endangered. Although only one proposed endangered species, Bidens napaliensis, was observed in Hanakapiai Valley, other species listed in the Federal Register as endangered have been recorded as growing here in the past. The only notable plant encountered along the trail from Hanakapiai Valley to Kee Beach is a solitary lobelioid, 'oha (Clermontia sp.), which was not flowering.

Human Impact

Areas where direct human impact upon native plants is likely to occur are those portions of the trail where these plants are growing along or below the trail. Particularly vulnerable is the stretch of trail between Waiahuakua and Hanakapiai Valleys, where six of ten proposed endangered species observed during this survey were seen. Near Waiahuakua Valley, for example, the proposed endangered makou is growing within one foot of the trail. Other places where native plants may be directly affected by heavy human use are the trails to Hanakoa and Hanakapiai waterfalls, where endangered species grow on the valley walls and may likewise exist near the trails.

Objective #3 - List probable threats to native plants with proposed park development.

Threats to native plants along the Na Pali Coast consist of four interrelated influences: people, fire, feral animals, and exotic plants.

People: The impact of human activities is probably the single greatest threat to the botanical resources of the Na Pali Coast and will require considerable evaluation by management. The Kee Beach to Kalalau trail and the spur trails of Hanakoa and Hanakapiai Valleys provide popular wilderness experiences for both novice and experienced hikers. The rigorous demands of the various trail sections limit entry and are a partial deterrent to undue numbers of people. Nonetheless, use of the Na Pali Coast has increased steadily within the recent years, resulting in a trend which may have a direct negative effect on the native plants along the coast. The human element can accelerate the dispersal of aggressive exotic plants, increase the possibility of fire, and augment the probability of trampling rare native plants.

Areas where people might directly damage native plants are the narrow portions of the Kee to Kalalau trail, where proposed endangered species such as makou and nehe (Lipochaeta alata var. alata) could be destroyed by trampling. These plants and other rare plants such as the hahalua and Lobelia could also be threatened if the trail were widened or cleared, either by mechanical or chemical means. Campsites in Hanakapiai and Hanakoa Valleys are located in areas relatively devoid of native plants, eliminating the possibility of direct destruction of rare native plants by camping.

Fire: The threat of fire is a definite management concern along the Na Pali Coast, and is directly influenced by drought conditions and the degree of human intervention. Fire is capable of destroying native plants growing on precipitous cliffs including the damaging of dormant seed stock. The coastline receives a substantial amount of rainfall in the winter months, but summers can be hot and dry. A rainfall gradient exists from the drier Kalalau Valley northeast to the wetter Kee Beach, which is more exposed to the moisture-laden trade winds. Dry summers coupled with the increase of hikers on the trail greatly compound the probability of fire along the coast.

Feral Animals: For over 50 years a large part of the Na Pali Coast was utilized for cattle grazing. This browsing pressure coupled with that of feral goats may have contributed to the eroded conditions and the limited native plant habitat

which exist today. The breakdown of the ancient Hawaiian trails, the formation of gullies, the introduction of exotic plants, and the disappearance of native plants were recognized as a problem exacerbated by the presence of cattle, and by the mid 70's, stock animals were removed. Today cattle are no longer a destructive force, but substantial numbers of feral goats remain. The goats' ability to seek forage in extremely rugged terrain, their reproductive capability, and their preference for succulent native plants are well-documented. The circumscription of native plants to accessible cliffs and valley walls is undoubtedly due in part to the presence of feral goats.

A number of goats were observed directly on the trail browsing on the native succulent nehe (Lipochaeta succulenta var. Barclayi) and naupaka-kahakai (Scaevola taccada). The majority of goat observations in this survey were limited to the cliff and talus slopes, particularly from Kalalau to Hoolulu. These precipitous locales include some of the richest native flora found along the coast which is threatened by goat browsing.

Exotic Plants: Exotic plants were seen throughout the Na Pali Coast survey and often comprise a significant percentage of the total vegetation cover. Some of these are aggressive species that displace native plants, such as lantana (Lantana camara), a noxious weed which is common along the trailside and on dry exposed slopes. Other noxious weeds include thimbleberry (Rubus rosaefolius), which is common as a ground cover in Hanakoa and Hanakapiai Valleys; blackberry (Rubus penetrans), encountered only once in Hanakoa Valley; and kikania-lei (Solanum aculeatissimum), a very spiny small shrub observed in two small valleys near Kalalau. All three of these spiny species are candidates for extermination. Molasses grass (Melinis minutiflora) known for its ability to spread and form mats is a frequent component of ground cover on dry slopes along the trail. Java plum and coffee are common trees constituting the dominant woody plants of some forests, and may be difficult to control due to the extent of their coverage. Two potential threats seen near Kee Beach are koa-haole (Leucaena leucocephala), known elsewhere for its ability to form dense thickets, and yellow water-lemon (Passiflora laurifolia), a vine which drapes trees along the trail. The taro vine (Scindapsus aureus) is a liana which was observed hanging from trees near Kee and growing prostrate in Hanakapiai Valley; its potential for spread and habitat damage are unknown.

Objective #4 - Recommendations

A fundamental consideration for the protection and management of the native plant communities on the Na Pali Coast from Kee Beach to Kalalau Valley involves the direct and indirect stresses people will put on the botanical resources. Linked with visitor management and equally important is the maintenance of these botanical resources. Land managers should closely scrutinize carrying capacities, permit issuance systems, public education programs, campsite selection, fire prevention, exotic plant control, hunting use, and access in the administration of the Na Pali Coast. Special areas, such as Waiahuakua and Hoolulu Valleys within the proposed Hono O Na Pali Natural Area Reserve, should also be noted and appropriate control exhibited. The following are some suggestions for management consideration:

Visitor Management

Carrying Capacities:

As proposed in the Na Pali Coast Interim Management Plan (1979), limiting visitor numbers is a good policy, but continual monitoring of trail and campsite vegetation conditions is also needed to regulate visitor holding capacity. Campsite locations within Hoolulu Valley and Waiahuakua Valleys should be discouraged due to the relatively intact native habitat and presence of rare plants. Other present or proposed campsites should be evaluated on the immediate presence of rare native flora which could be threatened by trampling, fires, and/or exotic plant dispersal.

Public Awareness:

Enforcement may be a problem along Na Pali's rugged coast, and as such, a direct but appealing education and information (I&E) program is warranted. This can be implemented both at the permit issuance level with a personal briefing and on the trail using signs and trail pamphlets. From a botanical perspective, these interpretive methods might emphasize the fragility and uniqueness of Hawaiian flora by noting historical changes, threats, common and rare native plants, ethnobotanic flora,

and interesting native plant communities. The local agency should request assistance from the public in the protection of botanical resources by discouraging fires, off trail hiking, and trampling of vegetation, and by preventing the dispersal of exotic plants.

Fires:

As mentioned previously, fire prevention should be emphasized in the I&E program and campfires especially discouraged in Hoolulu and Waiahuakua Valleys where a large population of native plants exist.

Boats:

Over 90% of the strand vegetation was not surveyed, thus no recommendation on boat landings is warranted. Where access by water is permitted, the possible presence of rare plants should be considered.

Helicopters:

Existing emergency helipads were not botanized in Hanakapiai and Hanakoa Valleys due to a lack of time, but these and other proposed helipads should be considered in future botanical surveys. Helicopter valley entry should be regulated, especially during the dry summer months as a crash and resultant fire might threaten native flora.

Natural Resource Management

Goats:

The impact of goats on the native plants should be carefully monitored. To keep the goat population under manageable levels and control the threat of overbrowsing, hunting should be opened to the public.

Exotic Plant Control:

A priority list of aggressive exotics requiring control should be developed. The list may be based on the exotic plants' distribution, response to control, latent dispersal, and potential to disrupt the native flora. Special care should be taken during mechanical or chemical control of exotic weeds to minimize damage to native plants. This is especially true of herbicides in

sensitive areas where drift could damage or destroy rare plant species. This policy should also be recognized during trail construction and maintenance.

Plant Introduction:

The desire for habitat enrichment or reforestation may result in intentional introduction of exotic plants. It is suggested that the potential for dispersal and spread of these plants be investigated before planting, and a follow-up monitoring program be instituted.

Special Areas:

The trail passing through Waiahuakua and Hoolulu Valleys within the proposed 3150 acre Hono O Na Pali Natural Area Reserve was found to support predominantly native vegetation. This admits the possibility that both valleys may harbor a relatively large number of rare and endangered native plants. This area should be managed as a special area until it reverts to a Natural Area Reserve status.

Rare Plants:

Trail identification of the exact location of proposed endangered plants should be discouraged as resultant exposure to possible damage would be greater.

APPENDIX D

A SURVEY OF THE NA PALI COAST FAUNA AND ITS HABITAT NO: 6 J 57 PM '79
ON THE ISLAND OF KAUAI - JULY, 1979

Division of Fish and Game
Department of Land and Natural Resources

INTRODUCTION:

In order that the Division of State Parks may fulfill their obligation to develop a management plan for the Na Pali Coast, base line data on the fauna and range conditions of that area was needed. The Division of State Parks, through a memorandum of agreement, requested the Division of Fish and Game to provide the technical staff to conduct a survey during July 1979 to provide this information.

During the period of July 16 through 20, 1979, two wildlife biologists conducted a feral goat census, game mammal range survey and a non-game inventory of the Na Pali Coast between Kalalau and Milolii Valleys. The findings of that survey are presented in this report, along with a discussion of the potential impacts on the wildlife resources resulting from other activities in the area. Specific management recommendations are provided where potential conflicts or needs were identified.

OBJECTIVES:

1. To determine the status, distribution and population trends of feral goats on the Na Pali Coast, Kauai.
2. To determine range conditions and trends on the Na Pali Coast.
3. To determine the status and distribution of wildlife other than game mammals, on the Na Pali Coast.
4. To identify potential conflicts between other recreational uses and the wildlife resources of the Na Pali Coast.
5. To recommend wildlife management measures for the Na Pali Coast.

METHODS:

The wildlife survey work on the Na Pali Coast was accomplished by Ronald L. Walker, Wildlife Branch Chief, and Thomas Telfer, Wildlife Biologist, Kauai Section during the period July 16 through 20, 1979. Access into the area and between survey locations was by commercial helicopter. Four Forestry Division botanists, Ms. Carolyn Corn, et. al., and a contract archaeologist, Ms. Myra Tuggle, made surveys in their fields of interest, and have reported their findings separately. An itinerary of the survey is presented in Table 1.

Feral goat populations were surveyed by walking the same routes used in previous surveys and tabulating goats by sex and age classes. Binoculars were used to aid in making observations when needed. A total goat population estimate for each area was made by using the following formula: Actual number of goats seen/Estimated percent of total area seen, x 100.

Feral goat range conditions were evaluated in three ways: 1. Subjective observations of vegetative conditions and the degree of erosion and amount of vegetation browsed, in comparison to similar observations made during the past ten years in the same areas. 2. Comparisons of current photo station photographs with those taken in previous years, and 3. Analysis of range plants both inside and outside established feral goat range study exclosures (areas fenced to exclude goats). Exclosure analysis consisted of tabulating lists of plant species occurrence, evaluating plant canopy coverage (estimated percentage of horizontal space occupied by each species per unit area), and estimating the degree of plant use (consumption) by goats. Coverage "classes" were used to reduce sampling error or bias. See Table 2 for a description of the coverage and use classes used.

The non-game wildlife and game birds were censused while walking game survey routes and incidentally during other parts of the day. Each species was ranked according to relative abundance. Notes were kept on nesting localities and other pertinent information.

FINDINGS:

Goat Population Status and Trends

Table 3 presents goat census totals for each area surveyed, by sex and age class. Estimated total populations are given in the last column. Table 4 presents goat population survey information collected in a similar manner since 1958 for comparison.

Kalalau Valley was censused on July 16, 1979 between 10:55 a.m. and 5:30 p.m. The feral goat population was considered somewhat below that of ten years ago (1969). A total of 36 goats was seen on the north side of the valley, whereas only 15 were seen on the south side. This type of distribution was typical of previous census findings, possibly because foot access to the southern slopes is easier, and hence has probably been more heavily hunted. Only twenty percent of the total goat range was estimated to have been visible from the transect walks; therefore, the actual goat population of Kalalau Valley, within the accessible area (below 2,000 feet elevation) was estimated at 255 animals. During the heat of the day, the majority of goats occupied the kukui groves and areas forested by yellow guava, and were not easy to census. Some of the goats could be located by their bleating.

Noticeable changes in range conditions from previous visits to these areas revealed the likelihood that the feral goat population had decreased over the past ten years. Some areas previously found heavily grazed by goats, appeared to be nearly unused during this survey. In addition to a possible decreased goat population, there may have been new disturbance factors that have altered goat distribution within Kalalau Valley (helicopters, and increased human activity) and thus affected habitat conditions.

Honopu Valley was censused on July 17, 1979 from 8:55 a.m. to 3:30 p.m. The feral goat population in Honopu was about average when compared with findings of previous years. Forty goats were counted during the survey. An estimated 80 percent of the valley could be visually censused; therefore, the estimated goat population at Honopu was 50. Honopu provides difficult access either by boat or helicopter, and therefore has probably not been as heavily hunted as some of the other areas along the coastline.

Awaawapuhi Valley was reached by crossing over from Nualolo Aina on July 19, 1979 between 7:30 a.m. and 12:40 p.m. Only 4 goats were seen between the valleys while crossing over; none within Awaawapuhi Valley itself, although a moderate amount of goat droppings and trails were noticed. Awaawapuhi appears to support goats intermittently, and there is a definite preference for the makai areas over the deep narrow valley bottom. Two adult goat carcasses were found within the valley bottom and perhaps died three to four weeks prior to our visit there.

Nualolo Aina was surveyed on July 18, 1979 between 8:30 a.m. and 3:45 p.m. The survey party hiked up the valley bottom, then up a pinnacle in the back of the valley, then up a steep side slope to approximately 1,000 feet elevation, down a tributary, and to the head of the valley. A total of 34 goats was seen during the ground survey. Much of the valley floor was hidden by kukui forest, dense lantana and guava thickets: Therefore, only an estimated 65 percent of the total area within the valley was visually covered. The estimated total goat population in Nualolo Aina was 68. A much larger population had been recorded in Nualolo on previous censuses (see Table 4).

Milolii Bench (the makai slope north of Milolii Cabin) was censused early on July 20th, between 5:45 a.m. and 7:45 a.m. A total of 29 goats was tallied in that relatively small area, most of which moved in from the Nualolo cliffs, and a few from the top. Milolii Valley proper, was surveyed between 8:50 a.m. and 11:15 a.m. No goats were seen or heard at all in this area. Very few tracks were seen, though some droppings were observed on the south slope near photo station M-2. Milolii Valley is hunted rather heavily from the top, since it is accessible by a jeep road, and this may explain the lack of goats.

The sex ratio of those goats that could be classified, was 1.31 nannies to each billy. Whether or not this was a valid measure of the overall sex ratio is uncertain. Similar surveys generally favored the nannies slightly to the billies, yet aerial censuses in the mid-1970's revealed a reverse sex ratio, favoring the billies. It was noted in some of the valleys that there were flocks made up chiefly of billies. There were great differences in the sex ratios between the populations of the individual valleys, however the individual valley population samples were too small to provide reliable sex ratio data.

Twenty-one percent of the goats seen (that could be classified) were kids, primarily in the one-half to three-quarter size group. No young kids, in the one-quarter size class were seen. Goat productivity on the Na Pali Coast appeared to be normal.

Feral Goat Range Conditions and Trends

Considerable changes in the vegetation had occurred on the Na Pali Coast goat range from what existed during the last ground survey which was made in 1972. Many of the open areas in Kalalau Valley, formerly grazed by cattle had become further overgrown with shrubs, trees and exotic understory plants. The valley bottom vegetation had matured considerably. Kukui groves and yellow guava thickets had grown and had closed canopies to a greater degree than before. The dominant understory plant, air plant, had become almost a pure stand beneath the guava. Several years ago, air plant was noted as an invading species. There was also noticeable growth and spread of Java plum trees in the valley bottom and behind Kalalau Beach, which was formerly dominated by lantana and koa haole.

On the southern side of Kalalau Valley, an established goat enclosure was analysed on "Cabin Ridge." The results of that analysis are shown in Table 5. Yellow guava had increased its coverage both inside and outside the enclosure. The vegetation in this area was noticeably overgrown, and hardly used by goats in comparison to what was recorded on previous visits to the area. Alahee (Plectronia odorata), previously heavily browsed by goats in the enclosure vicinity, had become more widespread and had grown considerably. There was only slight grazing of yellow foxtail grass and horseweed (less than 5% of that available) outside the enclosure. All other plant species were untouched. Coverage classes were identical both inside and outside the enclosure, except that molasses grass, an uncommon species in the area, was found outside the enclosure and not inside. Photographs were taken here and further up the ridge and compared to those taken during previous surveys.

The lack of goat browsing in the vicinity of the "Cabin Ridge" enclosure may have been due to the regular use of that immediate site by commercial helicopters for "rest stops." On July 16th, commercial helicopters landed here at least three times (daily visits are probably more frequent than this), and at other times at a point above Kalalau Beach, while we were there.

Further up the south side of Kalalau Valley, there was much less open range land. Goat browsing on air plant, Bryophyllum pinnatum, and West Indian sage, Salvia occ.*, yellow guava, Psidium guajava and Bidens spp. was most prominent in this area.

The Kalalau Valley bottom adjacent to the stream was quite uniformly vegetated with yellow guava, with a dense air plant and fern understory. Goats had browsed chiefly on air plant and elephantopus, E. mollis, in that area.

Vegetation on the northern slope of Kalalau Valley appeared to be in good condition when compared with previous surveys. Goat droppings and trails were common, especially on the lower ridge ends above Kalalau Stream. Air plant and yellow guava had also increased in coverage on the northern side of the Valley.

*tentative identification

Apparently, cattle (one or more) still remain in Kalalau Valley, as droppings and tracks were seen. The State Parks caretaker reported seeing cattle down by the beach earlier in the year. These are apparently remnants of the Gay and Robinson cattle that were grazing in the area until the mid-1960's when most were removed.

Honopu Valley likewise showed considerable differences in vegetation since the last visit made there in 1972. Air plant had spread and become much more dense than formerly. The hau, Hibiscus tiliaceus, patches in the valley bottom, and lantana, Lantana camara, coverage had expanded considerably from what was noted on the previous visits to the area. Goat range conditions were considered "fair" to "good" in Honopu. Well-traveled trails and indications of moderately heavy browse consumption were prevalent on the upper shoulders of the side ridges. One photo station, (H-2) revealed that considerable erosion had taken place since the previous photo had been taken (see Appendix I.0). Though goat trampling and grazing do accelerate and contribute to erosion, it is not likely that these areas would heal even if goats were removed, since the gradient is too steep, and the upper soil horizon has already been lost. Honopu Valley continued to show an increased take-over by exotic noxious plants, primarily lantana, air plant and hau.

Nualolo Aina was also noted to have become increasingly overgrown with exotic plants. Lantana had become more widespread in the upper middle valley; however the kukui and yellow guava had matured and provided a more open understory in the upper valley bottom. Air plant had become well established in Nualolo Aina, whereas ten years ago, it went almost unnoticed. West Indian sage, though existing previously, had become one of the most prominent understory plants, and was one of the most heavily used by goats. Range conditions in the upper slopes, were generally good, despite the prominence of goat trails, and signs of regular goat activity. Air plant and horseweed, Conyza spp. were the most heavily used plants whereas the grasses were only used lightly. It was also noted that the horseweed was not as heavily used in the valley bottom as it was on the upper slopes. It appeared that goats prefer the steep side slopes to the valley bottom for grazing, probably because it affords greater security and a variety of escape routes.

The Nualolo feral goat enclosure was visited on July 19th, and analyzed for vegetative coverage and browse use by goats. The analysis results are shown in Table 6. Horseweed, pili grass and natal red top were heavily used by goats outside the enclosure. Yellow guava, Bidens sp. and narrow leaf plantain, Plantago lanceolata, were not found outside the fence, but did exist within the fence, indicating the likelihood that they had been eradicated by grazing goats in that vicinity. Yellow foxtail grass, Setaria glauca, was noted to have survived as an understory to lantana, whereas pili grass, Heteropogon contortus and natal red-top, Tricholaena repens appeared to be more competitive for open spaces. Yellow foxtail grass is normally one of the more heavily used grasses and probably has survived grazing by goats merely because of the protection afforded by the lantana overstory. Pili grass and red-top did not appear to be favored by goats for grazing. A small grass not able to be positively identified, but appearing to be a brome grass, and swollen finger grass, Chloris inflata were found outside the enclosure but not inside. These are less palatable grasses, and were not

grazed by goats, but had become established where competition had been reduced by goat consumption of the more palatable species. The vegetation at the Nualolo enclosure site did not appear to have changed much since the previous visit, except that pili grass had gained a stronger foothold within the open area of the enclosure. It has been found in the past that severe edaphic conditions on these wind blown cliffs have a great part in determining the condition and make up of range plants, and that the effects of grazing goats may be of secondary importance.

Awaawapuhi Valley had undergone tremendous vegetative changes. Ten years ago, the major ground cover was yellow foxtail grass; lantana was almost non-existent. During this survey, a very dense stand of air plant and West Indian sage covered the valley floor and slopes. Lantana had increased its coverage, but not into the lower mid valley, where it is too shady. The heaviest goat browsing was on horseweed. Air plant, West Indian sage and yellow foxtail grass were used only in moderate amounts. Goat activity in Awaawapuhi was so low that much of the vegetation on the valley bottom was knee deep and used only lightly. The seaward bluffs at Awaawapuhi were dry and eroded as they have always been. The lack of vegetation on these exposed areas is more a result of severe edaphic conditions than heavy grazing by goats.

The Milolii Bench was very dry, choked with lantana, and full of rough broken rock. Very little palatable forage was available in this area. That which existed consisted chiefly of West Indian sage and yellow foxtail grass. Airplant had not yet invaded this area, and possibly may never do so because it is too dry. Milolii Valley proper has undergone remarkable vegetative changes in the past five years. Java plum, koa haole, and yellow guava have matured similarly as in Kalalau Valley, and formed a semi-closed canopy forest and an open understory. Formerly, this area was almost impenetrable, consisting of scrub koa haole, lantana, cat's claw and others. During this visit, forage grasses were waist high, and hardly used at all, owing to the absence of a goat population.

Several photo station photographs taken throughout the Na Pali Coast during this survey trip and previously are presented in the appendix. These can be used for making comparisons with past and future photos at the same locations.

Non-Game Animals and Game Birds

Table 7 shows a list of all non-game and game bird species seen during the week of July 16 through 20, 1979 on the Na Pali Coast. A total of 25 bird species, including the koloa maoli, Anas wyvilliana, an endangered species and the Newell's shearwater, Puffinus puffinus newelli, a threatened species, was encountered on the trip.

One koloa was flushed from the upper Kalalau Stream on July 16th, and four others were observed flying along the coastline at Nualolo Aina early in the morning on July 18th. Use of all of these perennial streams by koloa is probably regular, but intermittent. Several of the streams had abundant opae, prawns, oopu, and aquatic insect larvae which koloa evidently feed upon.

Few Newell's shearwaters have been recorded during previous surveys, and only at great distances, where they were presumably traveling inland to their nesting burrows. This year however, a nesting population of Newell's was discovered behind the Milolii Cabin on the cliff face. The actual nest burrows could not be reached due to the inaccessible sheer rock cliff upon which they were apparently nesting. Characteristic vocalizations of shearwaters were heard just after dusk, and before dawn, that indicated that this was an actual nesting colony. It was judged that these birds were nesting on a shallow ledge approximately 250 feet above the cabin. This nest site is atypical of their normal nesting habitat, which is generally several miles inland, and under dense stands of uluhe fern.

Other sea birds observed during the survey included: brown boobies, Iwa (Great Frigatebird), White-tailed Tropic birds, and Noio (White-capped noddies). The noddies were nesting in two sea caves between Kalalau Beach and Honopu Beach in small numbers, and are not too commonly seen around the main islands. There is another large colony of nesting noddies between Hanakapiai and Hanakoa (an area we were not able to survey) that reputedly is visited by the commercial zodiac boat tours past the area.

A golden eagle, presumably the one first sighted in 1967, was observed above Nualolo Aina on July 18th.

The only game birds encountered during the survey were Chukar partridges, Erckel's francolin partridges, Lace-necked doves, and Barred doves. Ring-necked pheasants, regularly recorded on previous surveys into the area, were heard, but not seen on this trip. Kalalau Valley and Nualolo Valley very likely still support small populations of pheasants. Chukars were very common in Awaawapuhi and at Nualolo Aina. Erckel's francolins were heard in Milolii Valley, but not seen, nor were they heard further to the north.

Green sea turtles were observed between Nualolo Aina and Awaawapuhi and at Milolii Reef. One + 28" (carapace length) male turtle was encountered resting on the Milolii Reef at low tide. It was checked for tags (none), and was observed to have a large tumor-like growth at the base of its right hind flipper.

Feral cats were seen at Kalalau Valley, along with some semi-domestic cats that frequented the camp sites near the State Parks shed. Feral cats were previously recorded at Awaawapuhi and Nualolo Aina, but not during this survey. Walker noted possible feral cat droppings at Awaawapuhi.

DISCUSSION:

1. Public Hunting

The feral goat population on the Na Pali Coast provides considerable recreation for Kauai's hunters. The hunting season is limited to two months of the year: August and September. It is necessary to permit hunting during the summer months, since many hunters gain access to the area by boat, and can only do so when the ocean is calm. Goat hunting not only provides recreational opportunities, but is a necessity in order that goat numbers do not get out of hand, and cause severe damage

to the range. However, controls on the harvest of goats are also needed so that the recreational value can be maintained. Illegal, out-of-season hunting is suspected to be widespread, since the annual legally reported taken cannot account for the large annual reduction of goats that occurs. Enforcement of the Na Pali Coast against out-of-season and in-excess of bag limit hunting, has been very difficult, due to the lack of manpower, equipment, and access to the area by enforcement personnel. One of the greatest needs on the Na Pali Coast is to increase the effectiveness of the enforcement program. The cooperation of the Parks maintenance staff in the area in reporting suspected illegal hunting activity to the enforcement personnel would be very helpful.

Potential conflicts between hunters and hikers or campers in Kalalau and Pohakuao may exist. Both goats and hikers were seen within the open guava forest in the bottom of Kalalau Valley. The shooting of goats within this densely vegetated area may produce hazards to hikers in the area. Perhaps the upper valley will need to be closed to non-hunters during Saturdays and Sundays in August and September. Signs warning hikers of the hazard need to be thoroughly posted. A year round hazard exists where illegal out-of-season hunting goes on.

2. Helicopter Activity

Commercial helicopter traffic was noted to have some serious potential conflicts with game mammal management on the Na Pali Coast. During the survey, three separate helicopter companies, flying tours along the coast, were observed to produce considerable noise and disturbance. Helicopters passed by in intervals as short as every five minutes in some instances. Low level flights and those up into the narrow valleys were particularly disruptive. Goats have been observed to flee and hide from low flying helicopters; they apparently do not become used to the constant over-flights. We have noticed in Waimea Canyon that regular helicopter traffic may be responsible for movement of goats into the forest from the open cliff areas. The regular landing of helicopters near the "Cabin Ridge" goat enclosure in Kalalau Valley may have been the cause of goats vacating that area.

There have been numerous complaints by hunters, who have at great effort gotten into remote areas to hunt goats, only to be frustrated after stalking their game, when helicopters fly by and spoil their hunt. It would be advisable to consider the possibility of regulating aircraft altitudes, and flight paths over the Na Pali Coast, if the area is to be used for wildland recreational purposes. Several members of the survey party were noticeably annoyed by the constant overflights of the helicopters. It destroys the enjoyment of the wilderness aspect of the area. The landing of helicopters any place within the valleys proper should be prohibited. Much of the illegal hunting activity likely obtains access via commercial helicopters, and/or by commercial boats. Strict controls over landings could help to alleviate this problem.

3. Vegetative Changes

Upon assessing vegetation and range conditions on the Na Pali Coast, it was evident that substantial changes have taken place within the past ten years. Many of the invading exotics, such as air plant, Java plum, and yellow guava, have replaced much of what was once grassland. It is more than likely that this trend will continue. Some form of vegetation management may be necessary in some areas if the recreational values of these areas are to be maintained. A forest management plan could be helpful in maintaining suitable areas for recreational purposes, though not much can likely be done to maintain open grasslands that are more suitable for feral goat management and public hunting.

Feral goat grazing and browsing have both positive and negative effects on the existing rangeland. Goats do utilize and help to control some of the exotic plants that are spreading, such as air plant, elephantopus and guava, yet they also consume beneficial grasses, plants and spread seeds. To completely eradicate goats would permit the unchecked growth of many noxious plants. It would eliminate a valuable recreational resource: Hunting. On the other hand, an uncontrolled goat population could cause increased erosion and additional threat to rare native flora that is already restricted to those sites that are virtually inaccessible to goats. Sustained yield hunting can be justified so long as the goat populations are kept well under control. The most severe damage to the native habitat has occurred in the past when goat numbers were in the tens of thousands.

There are occasionally localized areas overpopulated by goats. Notably, the Pohakuao-Hanakoa area has reached this condition. The reason for these overpopulated sites appears to be related to poor access. Special limited hunting seasons could be declared in these areas if range damage is occurring.

4. Non-Game and Endangered Species Protection

The endangered koloa and threatened Newell's shearwater are relatively safe within the habitats they use on the Na Pali Coast. The only concern is to keep disturbance to a minimum. No immediate threat to either species was apparent under present conditions in the area. The development of higher levels of use further back in Kalalau Valley may be adverse to continued use by koloa, but this is a relatively minor concern.

The Noio (white-capped noddy) that nests in several caves along the sea cliffs should be protected from harassment. The reputed regular passage of commercial zodiac type boats into the sea caves while coming and going from Kalalau should be discouraged, as this disturbance factor could cause the abandonment of these nesting areas by the noio.

Green sea turtles, also an endangered species, are common along the Na Pali Coastline and should be protected against harassment. At one time this species nested at Nualolo Kai and at Milolii. Human disturbance and over-harvest may be the cause of their failing to nest there any more.

Hawaiian monk seals are very rarely seen near Kauai though some day, under protection and management, this endangered species may become more abundant and become a regular visitor along the Na Pali beaches.

Other non-game consist of common native or introduced species of birds and mammals. There are no particular concerns or problems related to them, so long as development does not exceed the wildland management status which the area is to be used for.

RECOMMENDATIONS:

1. Feral goat hunting should be continued as at present (August and September) on a lottery basis to assign weekends to hunters.
2. Special limited goat hunting seasons should be declared for localized over-populated areas by mutual agreement of the Division of State Parks and the Division of Fish and Game, if range damage occurs.
3. Hiker-camper safety should be improved during the goat hunting season by either declaring the upper Kalalau Valley "off limits" to non-hunters during hunting days or by adequately warning the non-hunting public of the hazards, with signs and handouts to be distributed with camping permits.
4. Enforcement of hunting regulations should be greatly increased, not only in Kalalau Valley, but by boat along the entire Na Pali Coast. Adequate funding for necessary equipment, manpower and patrol time must be provided if the area is to be managed properly.
5. The Department should seriously consider a commercial helicopter management policy to limit low level flights and landings to specific corridors, altitudes and sites. No commercial "rest stops" or landings should be permitted in areas that are used for public hunting. Low level flights should be limited to areas not in use by hunters or campers. If campers are permitted access by helicopter, the hours of drop-off should be limited to a specific period of time, so as to avoid constant disturbance in the wildland recreational area.
6. The Division of Forestry should be consulted about means to manage vegetation at specific sites that are to be used for intensive recreational purposes.
7. Commercial and private boat traffic should be discouraged from entering sea caves used for nesting by seabirds.
8. The Division of Fish and Game should be consulted before any large development projects are undertaken that may affect wildlife habitat adversely within the area.
9. Should endangered marine animals (Monk seals or green sea turtles) become regular visitors to the beach areas long the coastline, efforts to educate recreationists on the need to avoid harassment to them is needed.

10. A wildlife survey similar to this one should be conducted every five years to monitor trends and to re-evaluate management concerns.

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Date: November 9, 1979

Table 1
Itinerary of Na Pali Coast Wildlife Survey
July 16-20, 1979

July 16, 1979

10:00 Depart Princeville Airport for Kalalau Beach via helicopter
10:45 Move survey party from Kalalau Beach to "Ohia Ridge", and
"Cabin Ridge" (Starting point of game surveys)
17:30 End game survey at Kalalau Beach

July 17, 1979

08:30 Depart Kalalau for Honopu Valley via helicopter
08:55 Survey game and non-game within Honopu
15:30 End wildlife survey
15:30 Depart Honopu for Nualolo Aina via helicopter

July 18, 1979

08:30 Begin game and non-game census of Nualolo Aina
16:15 Ended game and non-game census on Nualolo Aina

July 19, 1979

07:30 Crossed from Nualolo to Awaawapuhi on foot-Surveyed
Awaawapuhi Valley, and makai ridges.
13:50 Ended wildlife survey Awaawapuhi to Nualolo
15:45 Departed Nualolo Aina for Milolii Beach via helicopter

July 20, 1979

05:45 Surveyed wildlife on Milolii Bench and Milolii Reef
07:45 Ended wildlife survey at Milolii Bench and Reef
08:50 Began survey of Milolii Valley
11:15 Ended survey of Milolii Valley
15:00 Departed Milolii for Princeville Airport via helicopter

Table 2

Description of Coverage and Use Classes
for Vegetation Analysis at Feral Goat Enclosures

COVERAGE CLASSES:

- 1 = Trace amount to 5% of total area covered by plant canopy
- 2 = 5% to 30% of total area covered by plant canopy
- 3 = 30% to 50% of total area covered by plant canopy
- 4 = 50% to 70% of total area covered by plant canopy
- 5 = 70% to 95% of total area covered by plant canopy
- 6 = 95% to 100% of total area covered by plant canopy

USE CLASSES:

- /1 = Trace amount to 5% of available foliage used
- /2 = 5% to 30% of available forage used
- /3 = 30% to 50% of available forage used
- /4 = 50% to 70% of available forage used
- /5 = 70% to 95% of available forage used
- /6 = 95% to 100% of available forage used

Table 3

Results of Feral Goat Census on Na Pali Coast, Kauai
July 16-20, 1979

Survey Location	Billy	Nanny	1/4	1/2	3/4	Unident.	TOTAL GOATS	ESTIMATED* POPULATION
Kalalau (N. Side)	5	11	0	4	4	12	36	(20) 180
Kalalau (S. Side)	3	10	0	2	0	0	15	(20) 75
Honopu Valley	20	15	0	0	3	2	40	(80) 50
Awaawapuhi Valley	0	0	0	0	0	0	0	(100) 0
Nualolo Aina	13	22	0	2	5	2	44	(65) 68
Milolii Bench	7	5	0	1	2	14	29	(85) 34
Milolii Valley	0	0	0	0	0	0	0	(60) 0
TOTALS	48	63	0	9	14	30	164	407*

* This total does not include all of the goat habitat on the Na Pali Coast, but only those areas covered by the census routes shown. An estimated overall Na Pali Coast goat population is 650.

Numbers in parentheses indicate approximate percentage of area visually covered on survey routes for each area.

Table 4

NA PALI COAST GOAT CENSUS RESULTS - 1958-1976

Division of Fish and Game, D.L.N.R.

METHOD: AREA	Ground/1 July 1958	Ground/2 May 1965	Ground/3 June 1968	Ground/4 May 1972	Aerial/5 May 1973	Aerial/6 Apr 1974	Aerial/7 Apr 1975	Aerial/8 May 1976
Pohakua	N.C. (NC)	N.C. (NC)	N.C. (NC)	41 (?)	28 (?)	21 (?)	52 (69)	N.C. (NC)
Kalalau	78 (320)	68 (272)	74 (123)	62 (?)	128 (?)	74 (?)	77 (128)	110 (440)
Honopu	77 (230)	66 (88)	26 (36)	43 (?)	77 (?)	14 (?)	56 (70)	42 (84)
Awaawapuhi	30 (90)	22 (22)	16 (18)	7 (?)	35 (?)	30 (?)	54 (72)	13 (26)
Nualolo Aina	120 (211)	63 (84)	61 (81)	58 (?)	46 (?)	54 (?)	88 (110)	83 (119)
Miloli	44 (180)	N.C. (NC)	11 (15)	0 (?)	13 (?)	51 (?)	36 (60)	144 (205)
Totals	349 (1025)	219 (466)	188 (273)	211 (?)	327 (?)	244 (?)	363 (509)	419 (928)
	1,150	900	1,125	?	700	610	786	981

Sources of data;

- /1 1959. Warner, R. E. Wildlife Management Research, Feral Goat Survey. State of Hawaii Division of Fish & Game, Honolulu, Project 5-R-9, Job No 44(9).
- /2 1965. Swedberg, G. E. Wildlife Management Research, Quantitative Studies, Game Mammals State of Hawaii Division of Fish & Game, Honolulu, Project W-5-R-16, Job 53 (16).
- /3 1968. Telfer, T. C. Wildlife Management Research, Quantitative Studies Game Mammals. State of Hawaii Division of Fish and Game, Honolulu. Project W-5-R-19, Job 53(19).
- /4 1972. Telfer, T. C. Statewide Pittman-Robertson Program: Feral Game Mammal Range Surveys on the Island of Kauai. Division of Fish & Game, Honolulu. Proj. W-15-2:III-B(5)
- /5 1973. Telfer, T. C. Statewide Pittman-Robertson Program: Feral Game Mammal Range Surveys on the Island of Kauai. Division of Fish & Game, Honolulu. Proj W-15-3:III-B(6).
- /6 1974. Telfer, T. C. Statewide Pittman-Robertson Program: Feral Game Mammal Range Surveys on the Island of Kauai. Division of Fish & Game, Honolulu. Proj W-15-4:III-B(6).
- /7 1975. Telfer, T. C. Statewide Pittman-Robertson Program: Feral Game Mammal Range Surveys on the Island of Kauai. Division of Fish & Game, Honolulu. Proj W-15-5:III-B(8)
- /8 1976. Telfer, T. C. Statewide Pittman-Robertson Program: Status, Trends and Utilization of Game Mammals and their Associated Habitats on the Island of Kauai. Division of Fish and Game, Honolulu. Project W-17-R-1: R-II-C.

N.C. = No Census Made

Plain Numbers indicate actual number of goats counted on surveys.

Bracketed Numbers indicate estimates of goat populations based on percentage of area actually visible to the census personnel: No. of goats seen/% of total area seen x 100.

Circled Totals = Estimated Total Goat Population on Na Pali Coast for that year.

Table 5

Vegetation Analysis at Kalalau Valley
 "Cabin Ridge" Feral Goat Exclosure
 July 16, 1979

Common Name	Scientific Name	Coverage/Use Outside	Coverage Inside
Yellow Guave	Psidium guajava	3/0	3
Aalii	Dodonaea eriocarpa	3/0	3
Bracken Fern	Pteridium aquilinum	2/0	2
Lantana	Lantana camara	1/0	1
False Vervain	Stachytarpheta cayennensis	1/0	1
Horseweed	Conyza bonariensis	1/1	1
Hialoa	Waltheria americana	1/0	1
Japanese Tea	Cassia leschenaultiana	1/0	1
Little Ironweed	Vernonia cinerea	1/0	1
Yellow Foxtail	Setaria glauca	4/1	4
Ricegrass ?	Paspalum sp.	2/0	2
Molasses Grass	Melinis minutiflora	2/0	0
Pilipiliula	Chrysopogon aciculatus	1/0	1
Star-burr	Acanthospermum australe	1/0	1

Table 6

Vegetation Analysis at Nualolo Aina Feral Goat Exclosure
 July 19, 1979

Common Name	Scientific Name	Coverage/Use Outside	Coverage Inside
Lantana	Lantana camara	5/0	3
Yellow Guava	Psidium guajava	0	1
Beggar Tick	Bidens spp.	0	1
Horseweed	Conyza bonariensis	1/5	1
Narrow-leaf Plantain	Plantago lanceolata	0	1
Daisy Fleabane*	Erigeron karvinskianus	1/0	1
Yellow Foxtail	Setaria glauca	4/2	3
Natal Redtop	Tricholaena repens	2/5	3
Swollen Fingergrass	Chloris inflata	2/1	0
Pili grass	Heteropogon contortus	1/5	2
Brome grass?	Bromus sp.?	2/1	0

* tentative identification

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Table 7
 Bird Species Observed on the Na Pali Coast, Kauai
 July 16-20, 1979

Common Name	Scientific Name	Kalalau	Honopu	Awaawapuhi	Nualolo	Miloli	Bench	Miloli	Valley	TOTALS
SEABIRDS:										
Newell's Shearwater	<i>Puffinus p. newelli</i>	*				35*				35
W. T. Tropicbird	<i>Phaethon lepturus</i>	9	8	3	9	1		3		33
Brown Booby	<i>Sula leucogaster</i>	1			1	1				3
Frigatebird (Iwa)	<i>Fregata minor p.</i>		1							3
White-Capped Noddy	<i>Anous minutus</i>	2		1						3
WATERFOWL & SHOREBIRDS:										
B. C. Night Heron	<i>Nycticorax nyct.</i>				1					1
Hawaiian Duck (Koloa)	<i>Anas wyvilliana</i>	1	1			4				6
Wandering Tattler	<i>Heteroscelus incan.</i>		1			3				4
GAME BIRDS:										
Lace-Necked Dove	<i>Streptopelia chin.</i>	7			4					11
Barred Dove	<i>Geopelia striata</i>	2			4					6
Jungle Fowl	<i>Gallus gallus</i>	3								3
R. N. Pheasant	<i>Phasianus colchicus</i>	*								*
Chukar Partridge	<i>Alectoris graeca</i>			6	17	1*		2		26
Erckel's Francolin	<i>Francolinus erckelii</i>					6*		1		7
RAPTORS:										
Barn Owl	<i>Tyto alba</i>		1		2			1		4
Haw'n Short-Eared Owl	<i>Asio flammeus</i>				1			1		2
Golden Eagle	<i>Aquila chrysaetos</i>				1					1
INTRODUCED NON-GAME BIRDS:										
Shama Thrush	<i>Copsychus malabari.</i>	1			3					4
Chinese Thrush	<i>Garrulax canorus</i>	22	2*	2	9	1		2		38
Mockingbird	<i>Mimus polyglottos</i>				3	1				4
Indian Mynah	<i>Acridotheres trist.</i>	15		3	18	15		4		55
Japanese White-eye	<i>Zosterops japonica</i>	65	24	9	38	19		18		173
Ricebird	<i>Lonchura punctulata</i>	15	*		23	8				55
Red Cardinal	<i>Richmondia cardin.</i>	3			9	6				18
House Finch	<i>Carpodacus mexicanus</i>	35	15	16	17			1		84

* indicates birds heard, but not seen except in case of ricebird, where nest was found.

DIVISION OF
STATE PARKS
MAY 16 2 04 PM '80

A SURVEY OF THE NA PALI COAST FAUNA AND ITS HABITAT
ON THE ISLAND OF KAUAI - APRIL 1980 SUPPLEMENT

This supplements information presented in a July, 1979 report entitled, "A Survey of the Na Pali Coast Fauna and Its Habitat on the Island of Kauai". The information is derived from a wildlife survey of the area between Kalalau Valley and Ke'e Beach (Ha'ena) during the period of April 9-11, 1980. Wildlife survey personnel included Ronald L. Walker and Tom Telfer, of the Division of Forestry and Wildlife, Department of Land and Natural Resources.

Feral goats were counted and tabulated by location, age class and sex. Non-game wildlife was censused and ranked according to relative abundance. Notes were taken on game range conditions as they pertained to wildlife management. Weather during the survey was partly cloudy on 9 and 10 April, and windy and rainy on 11 April 1980.

FINDINGS:

A total of 80 goats was counted between Kalalau and Hanakoa Valleys on the 9th of April, 1980. In the valley bottoms under Kukui groves, several goats were found that were extremely tame. Range conditions were good in the Pohakuao area; little overgrazing was found. The most heavily used plants were: yellow foxtail, (Setaria glauca); Ti, (Cordyline terminalis); false vervain, (Verbena sp.); airplant, (Bryophyllum pinatum); Bidens spp. and other common exotic forbs and grasses. Sporobolus sp. was a very prominent grass along the Pohakuao portion of Kalalau Trail, and, evidently, was not used heavily by goats.

No goats were seen on the Ha'ena side of Hanakoa, though several were heard at Waiahuakua Valley, and one at Hoolulu Valley. A very small number of goats occupied these forested valleys, as evidenced by the few browsed plants seen.

The goat population east of Kalalau Valley was surprisingly small considering the relative inaccessibility to hunters. One of the nannies appeared to be sickly and malnourished but the condition of the majority of the herd appeared to be good. Good productivity was evidenced by the abundance of young goats seen. The sex ratio (1.8 nannies to each billy) was unusually high. No reason for the high sex ratio could be determined.

NON-GAME:

The non-game fauna in the area east of Kalalau Valley was lacking in diversity. Only thirteen species of non-game birds plus the ring-necked pheasant (a game bird) were observed during the three day trip. The Japanese white-eye (Zosterops japonica) was by far the most common in all of the areas surveyed. Linnets (Carpodacus mexicanus f.) were also very common. Walker noted an apparent association between the linnet and the large sisal patches in Pohakuao (Manono Ridge). The Chinese thrush (Garrulax canorus) was more common in the dryland forest, whereas, the Shama thrush (Copsychus malabaricus) was most abundant in the wetter shady valley bottoms. The diversity of non-game bird species decreased towards the eastern end of the Kalalau Trail, where wetter conditions prevailed.

A pair of terns, presumably the Noio (Anous tenuirostris melanogenys) was seen along the Pohakuao coastline, where they are known to nest in caves. White-tailed tropic birds (Phaethon lepturus dorotheae) and an unidentified booby, (Sula sp.) were the only other seabirds seen.

Although there were patches of typical nesting habitat of the Newell's Shearwater (Puffinus puffinus newellii) none were heard at night at either Hanakoa or Hanakapi'ai Valleys. No endangered species were encountered, though it is likely that Koloa, (Anas wyvilliana) inhabit the streams on occasion.

Feral cats (Catus felis), rats (Rattus rattus), toads (Bufo marinus) and metallic skinks (Leiopisma metallicum) were also recorded. Toads were particularly abundant all along the route.

Table I shows the results of the feral goat census. Table II shows the relative abundance of birds seen during the three days of the survey. Figure I shows the route of the survey and the itinerary.

DISCUSSION AND RECOMMENDATIONS:

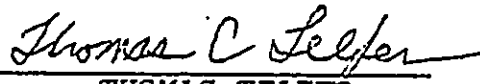
The tameness of the goats along the Na Pali Coast between Kalalau and Ha'ena indicates that they are rarely hunted. If the feral goat population between Hanakoa and Pohakuao increases to the point where the range conditions show overuse, a special hunting season should be declared to reduce their numbers. In this case, it would be best to close the Kalalau Trail to hikers for that period, for the purpose of safety. A somewhat less hazardous mode of hunting would be to allow bow hunters only, though there would still be some hazard to hikers, and there may not be a sufficient number of archers to adequately reduce the herd to more acceptable numbers.

It appeared that the Pohakuao goat population had not increased at the expected rate after the normal public hunting season, therefore, it may be that illegal hunting activity has kept this sub-population depressed. Nevertheless, that type of control poses an even greater safety hazard to hikers, since it is out of season and not known to the non-hunting public.

The Pohakuao-Hanakoa goat population should be monitored regularly and controlled to keep them within acceptable numbers. Hikers should be warned of the open hunting seasons by hand-outs issued with their camping permits and by the posting of signs.

There are no potential problems with non-game management in the eastern portion of the Na Pali Coast State Park, so long as the wildland nature of the area is preserved. Boat access to sea caves should be discouraged because of the Hawaiian tern nesting colonies that occur at these sites.

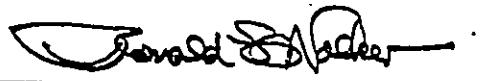
Prepared by:


THOMAS TELFER
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Approved by:


LIBERT LANDGRAF
State Forester

Submitted by:


RONALD L. WALKER
Wildlife Biologist

Date: May 15, 1980

TABLE I

Results of Feral Goat Census on the Na Pali Coast,
Kauai (Pohakuao to Kee Beach)
April 9-10, 1980

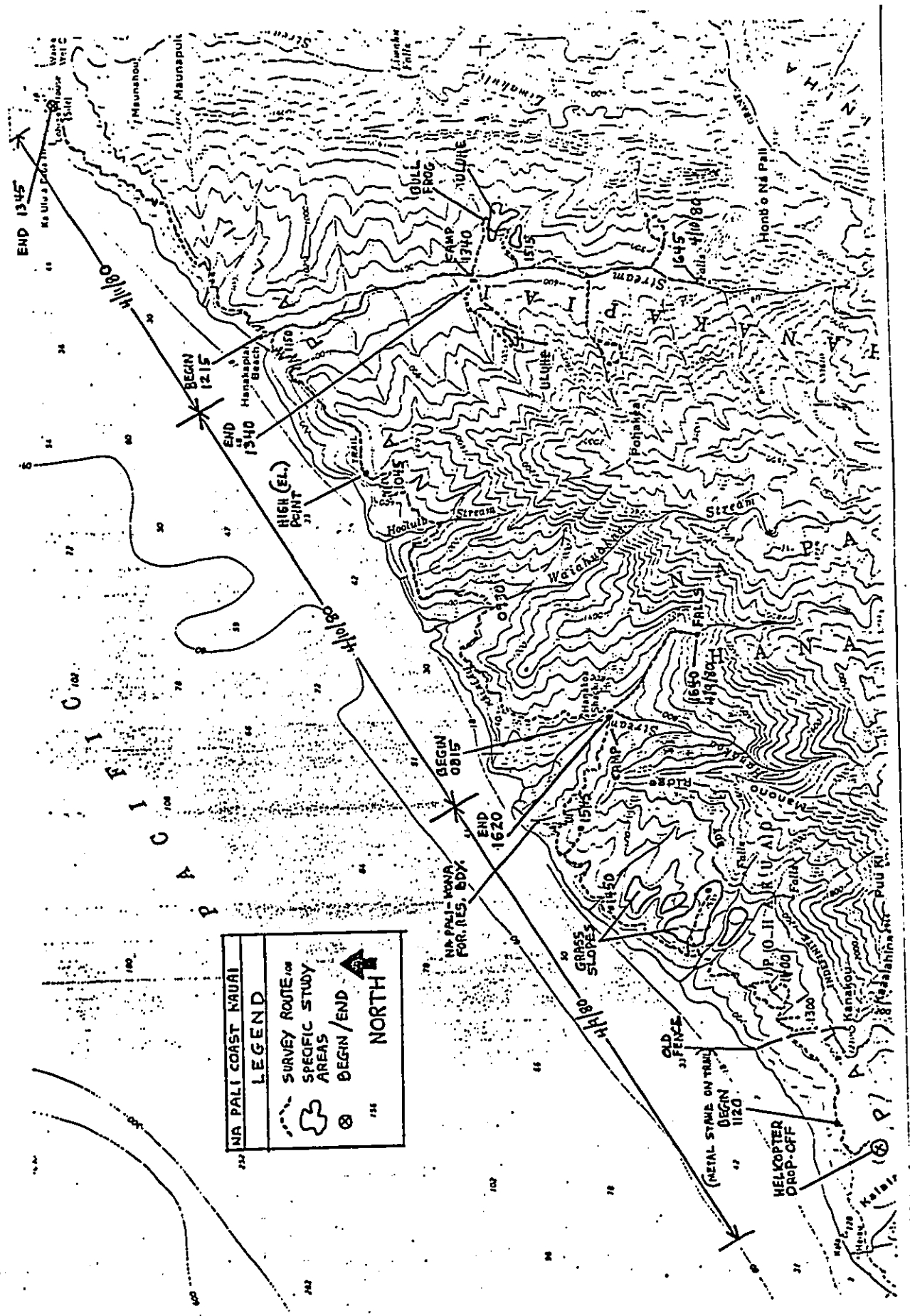
Survey Location	Billy	Nanny	1/4	1/2	3/4	Unident.	TOTAL GOATS	ESTIMATED* POPULATION
Kalalau to Hanakoa	21	38	4	11	6	1	81	123

*This total is based on an estimated 2/3 of the goat range visually covered during the survey.

TABLE II

Bird Species Observed on the Na Pali Coast
(Pohakuao to Kee Beach)
April 9-11, 1980

Common Name	Scientific Name	Kalalau to Hanakoa	Hanakoa to Hanakapiai	Hanakapiai Kee beach
SEABIRDS:				
W.T Tropicbird	<i>Phaethon lepturus</i>	6	6	-
White-Capped Noddy	<i>Anous tenuirostris</i>	2	-	-
Booby (unidentified)	<i>Sula</i> sp.	1	-	-
WATERFOWL & SHOREBIRDS				
B.C. Night Heron	<i>Nycticorax nycticorax</i>	-	2	-
Wandering Tattler	<i>Heteroscelus incanus</i>	-	1	-
Golden Plover	<i>Pluvialis dominica</i>	3	-	-
GAME BIRDS				
Ring Necked Pheasant	<i>Phasianus colchicus</i>	1	-	-
INTRODUCED NON GAME BIRDS				
White-eye	<i>Zosterops japonica</i>	106	148	28
House Finch	<i>Carpodacus mexicanus</i>	58	59	8
Ricebird	<i>Lonchura punctulata</i>	34	8	-
Shama Thrush	<i>Copsychus malabari</i>	11	36	3
Chinese Thrush	<i>Garrulax canorus</i>	12	14	-
Red Cardinal	<i>Richmondia cardinalis</i>	7	19	4
Indian Mynah	<i>Acridotheres tristis</i>	5	-	-



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APPENDIX E

State of Hawaii
Department of Land and Natural Resources
DIVISION OF FISH AND GAME

MARINE SURVEY OF THE NA PALI COAST,
ISLAND OF KAUAI

INTRODUCTION

This report summarizes the results of a marine fish survey conducted by the Division of Fish and Game between June 4 and 8, 1979 along the Na Pali Coast of Kauai (Figure 1). The survey was conducted to obtain and evaluate baseline nearshore marine resources information for the "Na Pali Coast Management Plan" being prepared by the Division of State Parks, Outdoor Recreation and Historic Sites of the Department of Land and Natural Resources.

Division of Fish and Game personnel participating in the survey included Paul Kawamoto, Henry Okamoto, Brian Kanenaka and Shugo Masuda.

METHODS AND MATERIALS

Fish counting transect stations were established at various locations subsequent to conducting cursory examinations of nearshore areas along the Na Pali Coast. The Division of Fish and Game's 13-foot inflatable boat was utilized for accomplishing the 12-mile coastline survey. Fish counts were conducted by snorkel diving along a pre-measured 250-yard long transect line or within a 100-foot diameter area. In conducting a 250-yard fish count, the two divers, one on each side of the line, recorded fish species, length and numbers on plastic slates within a 40-foot swath, with each diver responsible for a 20-foot swath parallel and adjacent to the line. In conducting a 100-foot diameter quadrat, one end of a pre-measured 50-foot cord was attached to a stationary object to allow delineation of a 100-foot diameter circle within which observations were made by two counters. The time of day and water depths were recorded during the start and end of each fish count. Upon completing a fish count, the information was transcribed onto data sheets for subsequent analysis. Further, notes concerning habitat type, water clarity, observations on currents and surge, and other pertinent information were included in the data sheets.

The approximate weight of each fish was estimated by multiplying the cube of the fish length by a previously determined species constant derived from known length-weight relationships. The estimated standing fish crop, expressed in term of pounds per acre, was then derived by multiplying the weight of each species recorded by the ratio: 43,560 square feet (or one acre)/area (in square feet) covered by the fish count.

RESULTS AND DISCUSSION

A total of 15 fish counts was conducted at 11 locations along the Wa Pali coast that are described as follows:

HANAKAPIAI

Hanakapiai (Figure 2) is located about three miles west of Haena and characterized by a wide sand beach approximately 200 yards long. The sand extends into the offshore area to at least the 20-foot depth and there is no apparent evidence of coral or rocky substrate within 300 yards from the shoreline.

A 100-foot diameter quadrat was conducted to the west of the beach where lava cliffs and rocks began to replace the sandy shoreline substrate (Station #1). The fish count was conducted in waters ranging from 2 to 10 feet in depth around two small rocks that jutted above the water (Figure 3). Although only four species of fishes were recorded at this station, a large school of threadfin or moi (Polydactylus sexfilis) contributed significantly to the standing crop at this Station (Table 1).

The sand bottom and smooth lava rock substrate afforded little shelter to reef dwelling fish and thereby explains the low species diversity observed on this fish transect. It should be noted that the smooth lava bench exposed to breaking shoreline waves constituted a favored habitat for the moi.

Along the shoreline, typical splash zone fauna and flora were sparse. Small quantities of flat sea urchins or ha'uke'uke (Podophora atrata), a'ama crabs (Grapsus grapsus) and small limpets or 'opihi (Cellana sp.) were noticed especially among rocks that were exposed to splashing waves. Algae growth was sparse.

Shoreline waves averaged about two feet in height, which, combined with the shallow water depths fronting the beach, made boating access to shore difficult. Water clarity was good despite the occurrence of freshwater "lensing" which obscured underwater visibility to some extent. Two persons were observed beachcombing the shoreline area.

TWIN ROCKS

"Twin Rocks" is a descriptive name given to the shoreline area characterized by a pair of small rock outcroppings which is located approximately 3/4-mile southwest of Hanakapiai (Figure 2). Steep cliffs and four sea caves highlight a spectacular view of the shoreline. There is no land trail access to this area.

A 100-foot diameter quadrat (Station #2) was conducted around the larger of the rock outcroppings (Figure 4) which rose sharply from a depth of about 30 feet. A total of 20 fish species and an estimated standing crop of 1,526 pounds per acre were recorded at this Station (Table 1). Fishes contributing significantly to the standing crop included the piha (Spratelloides delicatulus), 'omilu (Caranx melanopygus), maikoiko (Acanthurus leucopareus), palani (A. dussumieri), pualu (A. xanthopterus) and kala (Miso unicornis).

Splash zone fauna observed on the wave exposed portion of the rock outcropping included the opihi and ha'uke'uke. Water clarity was excellent with no noticeable current.

HANAKOA

Hanakoa (Figure 5) is located about mid-way between Hanakapiai and Kalalau and approximately one mile southwest from "Twin Rocks". A small cove-like area bordered by cliffs on both sides and a stream flowing through a boulder beach identifies this site (Figure 6). A 100-foot diameter quadrat (Station #3) was conducted in depths ranging from 5 to 7 feet and 13 fish species with a standing crop of 209 pounds of fishes per acre were enumerated (Table 1). The bottom substrate in the transect area consisted primarily of large boulders with no coral growth.

Along the shoreline, the exposed rocks especially at the stream were covered with a lush growth of brown algae (*Chnoospora* sp.). Generally, opihi were fairly abundant but small in size. The cliffs at Hanakoa offered some protection from the northeastern trades and the surface water was calmer in the cove than further out in the wind-exposed areas of Stations #1 and 2 (Figure 3). The large volume of fresh water flowing into the sea produced a pronounced temperature gradient with the colder surface fresh water lying over the sea water. Other than this "lensing" effect which blurred underwater visibility to some extent, the water was clear. Due to shoreline breaks, the boat could not be safely beached ashore; however, swimming ashore was relatively easy. Slippery rocks are a definite hazard along this shoreline.

WATERFALL ARCH

"Waterfall Arch" is another descriptive name used to identify a survey site about one mile southwest of Hanakoa (Figure 5). As the name implies, there are two small waterfalls on the west side of a lava arch (Figure 8).

A 100-foot diameter quadrat was conducted through the arch in depths ranging from 6 to 10 feet (Station #4). A total of 15 fish species with a standing crop of 500 pounds of fishes per acre was recorded at this Station (Table 1). Also observed in the transect area was a small, 20-inch carapace length green sea turtle (*Chelonia mydas*). The sand and boulder substrate at this site was devoid of coral growth (Figure 9). Splash zone fauna and flora were sparse. A slight easterly current was noticed while swimming through the arch.

KALALAU

Stretching almost two miles in length along the Na Pali coast and about one mile southwest of "Waterfall Arch" is Kalalau, one of the better known beaches in the area (Figure 10). The shoreline beach consists of a thin strip of sand backdropped by cliffs along the easterly portion (Figure 11) that transforms to a boulder covered beach centrally where the Kalalau Stream empties into the sea (Figure 12). From about 400 feet west of the stream, a long stretch of sand beach continues westerly toward Honopu. Examination of the offshore bottom topography indicates a corresponding sand and boulder substrate consistent with the shoreline composition.

A 250-yard fish counting transect (Station #5) was made in about 8 feet of water approximately 100 feet seaward of the boulder beach (Figure 13). A total of 20 species of fishes with a standing crop of 48 pounds per acre was recorded at this Station (Table 1). Although the bottom substrate consisted of numerous fish-shelter type crevices along the transect route, a low fish density resulted. This was apparently due to the higher concentrations of fishes observed in the shoreline breaker zone.

Small sized coral colonies, primarily Pocillopora meandrina, were noted on the boulder substrate. However, there were more dead than live colonies observed in the area (Figure 14). Although numerous 'opihi (Cellana talcosa) were observed attached to the boulders, macro-algae growth on the substrate was absent.

Shoreline waves caused by shallow nearshore depths limited ocean access into the sand beach. Landing was therefore possible only by swimming ashore. During the survey, one pole fisherman, two 'opihi pickers and six bathers were observed along the Kalalau shoreline.

LAVA TUBE

Approximately two miles southwest from Kalalau Stream and one-half mile west of Honopu is a small cave which tunnels into a steep cylindrical shaped lava chamber which has been descriptively named "Lava Tube" (Figure 15 and 16). A relatively smooth rock islet emerges from a 40-foot depth near the center of the open chamber where a 100-foot diameter quadrat (Station #6) was conducted. A total of 15 fish species with an estimated standing crop of 274 pounds per acre was observed at this Station (Table 1). Three small green sea turtles were also observed in the survey area.

The lava chamber offered an excellent respite from the choppy sea conditions that prevailed on the open ocean during the time of survey.

MUALOLO AINA

Mualolo Aina is located nearly one-mile west of the "Lava Tube," between Alapii Point and Puanaica Point, east of Mualolo Kai State Park (Figure 18). Steep cliffs border a boulder beach that is approximately 150-yards in length. The beach is located within a small cove (Figure 17).

A 100-foot diameter quadrat (Station #7) was conducted about 200 feet offshore of the boulder beach in 6 to 7 feet of water. A total of 16 species with a standing crop of 116 pounds of fishes per acre was recorded at this Station (Table 1).

The bottom substrate at the transect site consisted primarily of moderate sized boulders. The soft coral (Palythoa tuberculosa) covered about five percent of the boulder surfaces.

Splash zone fauna was exceptionally dense. Three species of 'opihi (Cellana exarata, C. sandvicensis and C. talcosa), a good portion of which were of harvestable size (1-1/4 inch and larger shell length), occurred in large quantities. Other splash zone invertebrates such as a'ama crab, ha'uke'uke and the opihi predator Purpura aperta were also numerous. Lush growths of the red algae (Gelidium sp.) were noticed along the shore, especially at the mouth of Mualolo Stream.

Access to shore was accomplished by swimming through shoreline waves that were two to three feet high in the calmer sections of the cove and scrambling up slippery boulders along the shoreline.

MUALOLO KAI

Mualolo Kai State Park surrounds a cove situated between Makuaiki and Alapii Points (Figure 18). The east side of the cove is well defined by an expansive, shallow limestone reef that is exposed during low tide (Figure 19). In addition to this prominent reef, smaller reefs front the beach and provide considerable protection from wave action. At about the center of the cove, a narrow channel separating the reefs allowed easy access for landing a skiff on the sand and boulder beach (Figure 20).

Three 250-yard transects (Stations #8, 9 and 10) were conducted offshore of the Mualolo Kai State Park (Figure 18).

Station #8 was established along the westerly portion of the large, shallow limestone reef. The fish counting transect followed the edge of the large limestone reef. The substrate was composed of 50% limestone reef, 25% boulders, 20% sand, and 5% live corals. Large crevices were common along the face of the reef which dropped sharply to a depth of about 15 feet. A total of 44 fish species with an estimated standing crop of 306 pounds per acre was recorded at this Station (Table 1). The surgeonfish, maikoiko was the most dominant fish in term of weight and number. Most of the fish were observed foraging on the shallow reef but warily retreated into crevices as the divers approached along the reef's edge. The black sea cucumber or lolo (Eolothuria sp.) occupied the sand habitat, and a two-pound sized octopus or he'e (Polypus marmoratus) was observed on the smooth hard bottom substrate beyond the outer edge of the reef.

Station #9 was established north of the large limestone reef in depths ranging from 6 to 30 feet. A slight westerly current was noted during the fish count. Water clarity was excellent with underwater visibility exceeding 60 feet. The bottom topography in the transect area was primarily composed of a limestone bed with numerous fish-shelter type crevices. Predominant coral growths of Pocillopora meandrina and Porites lobata covered about 30 percent of the substrate. Other corals observed included colonies of Pocillopora damicornis, Porites evermanni, P. duerdeni, and Montipora flabellata. Algae growth was sparse. A total of 51 species with an estimated standing crop of 2,116 pounds of fishes per acre was recorded at this Station (Table 1). Fishes contributing significantly to the standing crop were primarily herbivorous species including the nenu (Kyphosus cinerascens), manini (Acanthurus triostegus), surf maiko (A. guttatus), maikoiko, and kala. A red spiny lobster (Panulirus marginatus) and two small green sea turtle were also observed during the fish count.

Station #10 was established seaward of a large reef that fronted the west side of the cove. The bottom substrate was moderately irregular but lacked fish shelter crevices, and consisted primarily of limestone with about 5 percent coral cover. There was an abundance of the calcified algae Porolithon sp., while other algae species occurred only sparsely. Underwater visibility was about 40 feet. A total of 39 fish species with a standing crop density of 141 pounds per acre was recorded at this site (Table 1). In terms of weight, the black triggerfish or humuhumu-'ele'ele (Melichthys niger) contributed most significantly to the standing crop, while the damselfish (Stegastes fasciolatus = Pomacentrus jenkinsi) was the most numerous in terms of number.

Inspection surveys conducted over the large shallow limestone reef in the eastern portion of the cove revealed a flat reef surface with numerous deep holes, many of which could be hazardous to waders. At certain areas, of the reef, the short-spined sea urchin or wana (Echinometra mathaei) was very abundant. In contrast, only a few long-spined wana (Liadema pancispinnis), and the red pencil sea urchin (Heterocentrotus mammillatus) were noted near the outer edge of the reef. Macro-algae was sparse on the reef flat. The brown algae or "button limu" (Turbinaria sp.) was found near the outer edge of the reef. During low tide, few fishes were noted over the reef as compared to the large quantities of nenu, manini, maikoiko, kala and uhus that were observed foraging over the reef at high tide.

Waves washing over the outer edge of the shallow reef flats ranged between 2 to 3 feet in height. The waters within the cove were calm, and provided excellent snorkeling and fishing opportunities. There were a few large moray eels (Gymnothorax flavimarginatus) observed in certain reef crevices. Also in evidence were fresh water seepages along the shoreline area of the cove.

MILOLII

Milolii State Park is located adjacent to and west of the Kualolo Kai State Park, between Makuaiki Point and Keawanui (Figure 21). A small perennial stream is located on the western end. The beach front is about one mile in length backdropped by massive lava rock cliffs (Figure 22). Both ends of the beach are composed of boulders, while the central portion is almost exclusively sand. A small boat channel and anchoring site (Figure 23) is located almost directly in front of the Milolii State Park cabin, and except for a second narrow opening through an otherwise contiguous reef flat in the vicinity of Makuaiki Point (Figure 24), no other boat passage exists. Extending west of the small boat channel toward Keawanui is a fairly large shallow limestone bench.

Three 250-yard fish counting transects (Stations #11, 12 and 13) were conducted seaward of the fringing reef.

Station #11 was established near the middle of Milolii approximately 100 feet offshore of the breaker zone. Despite the highly irregular topographic relief of the bottom profile, fish-shelter type crevices were generally absent. The bottom was composed of about 60 percent lava rock, 30 percent limestone and 10 percent coral coverage. Underwater visibility exceeded 50 feet. The fish count revealed 37 species with an estimated standing crop of 637 pounds per acre. The nenu accounted for almost one-third of the total estimated standing crop (Table 1).

Station No. 12 was established to the west of Station No. 11. Underwater visibility was limited to about 30 feet, and slight westerly current was noticed during the fish count. The bottom profile consisted primarily of smooth limestone onto which a sparse growth of coral was observed. A total of 30 species with a standing crop of 119 pounds of fishes per acre was recorded at this Station (Table 1). Moderate growths of the red algae, Amansia sp. were noted, and the brown and white sea cucumber (Actinopygen mauritiana) was fairly common at this location.

Station No. 13 was established west of the boat channel in depths ranging from 8 to 10 feet. The bottom terrain was fairly irregular with a primary substrate of boulders and limestone interspersed by patches of sand. Coral growth covered about 25 percent of the limestone-boulder substrate (Figure 7). A total of 33 fish species with a standing crop of 325 pounds per acre was recorded at this Station (Table 1). Generally, the fishes were abundant in numbers and small in size. Profuse growths of the calcified algae Porolithon sp. were noticed throughout the transect area. A large green sea turtle measuring 36-inches in carapace length was also recorded in the transect area.

A cursory night survey was also conducted at low tide on the exposed limestone bench located at the eastern section of Milolii State Park towards Makuai Point primarily to determine the nocturnal species common to the area. The reef was surprisingly barren of marine life and only few of the following organisms were observed: moray eel (Gymnothorax spp.); white eel (Conger cinereus = C. marginatus); night octopus or he'e (Polypus ornatus); 'ala'ihī (Holocentrus sp.); upapalu (Apogon sp.); goatfish (Family Mullidae); sea cucumber or namako (Stichopus tropicalis); and small sized green spiny lobster (Panulirus pen penicillatus). The a'ama crab, sand crab or 'o-hiki (Cyclope ceratophthalma), and ku-pe'e (Merita polita) were also observed on the sand and boulder beach area.

As compared to Mualolo Kai, Milolii offered less opportunities for snorkeling and shoreline fishing. For example, the shallow reef flats at Milolii remained relatively barren of fish life irrespective of the tidal fluctuation, whereas at Mualolo Kai, large quantities of fishes migrated inshore at high tide to forage over the reef flats. Further, during the survey period the inshore waters at Milolii were noticeably turbid along certain sections of the shoreline, primarily attributable to the silt discharged by the Milolii Stream. Also, anchoring a boat at Milolii proved to be riskier than at Mualolo Kai due to Milolii's less protective narrow reef configuration.

REEF HOLE

"Reef Hole" is located between Milolii and Makaha Point (Figure 21) with a shoreline composition consisting of boulders. A narrow fringing limestone reef fronts the beach. An indentation in the outer face of the reef produced a small cove where a 100-foot diameter quadrat (Station #14) was conducted. Water depth ranged from 2 to 3 feet and a total of 28 fish species with a standing crop of 623 pounds per acre was recorded (Table 1). A green sea turtle and fairly lush growth of green algae (Caulerpa sp.) were noteworthy observations made in the transect area.

Although shoreline waves averaged about a foot in height, calm water conditions persisted throughout this area which was well protected from the normal northeast tradewinds. The area appears to provide for excellent nearshore fishing opportunities.

During the survey, three opihi pickers, who also appeared to be carrying thrownets, were observed on shore.

MAKAHA POINT

Makaha Point, a steep rocky promontory, is located about 1/2 mile southwest of "Reef Hole" (Figures 21 and 25). The shoreline is composed of boulders and limestone ledges. Patches of small reefs characterize the offshore area.

A 250-yard fish counting transect (Station #15) was conducted parallel to shore in about 8 feet of water. The substrate consisted of boulders and limestone. Coral was sparse and covered about one percent of the substrate. The bottom profile was moderately irregular with numerous fish-shelter type crevices. A total of 25 fish species with an estimated standing crop of 45 pounds per acre was enumerated at this Station (Table 1).

Although shoreline waves averaged two feet in height the offshore waters were extremely calm. In view of the low standing fish crop observed, fishing opportunities in the area are considered to be poor.

SUMMARY AND COMMENTS

The Na Pali coast marine survey covered approximately 12 miles of nearshore areas from Hanakapiai to Makaha Point. Overall, the total area surveyed is characterized by spectacular cliffs, sand and/or boulder beaches, lava caves, few live coral reefs and clear water.

During the week-long survey period, a total of 72 different species of fishes was recorded from 15 fish counting transects. Additionally, eight other species were recorded during inspections of areas beyond the transect limits (Table 2).

A summary of the 15 fish counting stations surveyed is presented in Table 1. The number of fish species recorded at the stations averaged 27 species (ranging between 4 and 59) while the estimated standing crop averaged 693 pounds of fishes per acre (ranging between 48 and 3,032). The number of individual fishes counted at each station averaged 3,834 individual fishes (ranging between 76 and 40,151 individuals).

Further analysis of the fish count data shows that the baitfish, piha, was the most numerous single species recorded while the moi had the highest standing crop. Collectively, the herbivores (rudderfish, surgeonfish and parrot fish) predominated over the carnivores (threadfin, goatfishes and wrasses) in both numbers and standing crop. Further, the common goatfishes, including the weke-'a'a (Mulloidichthys flavolineatus = M. samoensis) and weke-'ula (M. vanicolensis = M. auriflamma) were not observed in any of the fish counts as well as the large carnivores such as sharks and uluas (Caranx ignobilis). Green sea turtle sightings were fairly common with as many as seven turtles observed at Milolii in a single afternoon.

Much of the lava rock and boulder formations along the shoreline provided excellent habitat for splash zone organisms such as opihi and pipipi (Merita picea). Although opihi was generally abundant, most were small in size. Pipipi was especially abundant on boulders which were protected from direct wave action.

The data collected suggest that fishes were relatively scarce between Hanakapiai and Mualolo Aina. The bottom topography within this area was mostly sand, lava rock and smooth boulders offering little shelter to reef dwelling organisms. Further, the nearshore area was completely devoid of coral reefs. The near absence of live corals in the nearshore areas between Hanakapiai and Mualolo Aina is suspected to be due to the lowered salinity of the shoreline waters caused by fresh water runoff and seepage. Further, the high surf action and shifting sand conditions that predominate in the nearshore areas during winter months is believed to be retarding the growth of young coral colonies.

The Mualolo Kai and Milolii areas, on the other hand, displayed a moderate quantity of reef fishes which may be attributable to the extensive coral reef flats occurring at both areas (Figures 26 and 27).

The extensive reef areas at Mualolo Kai and Milolii were easy to walk over. However, like most reefs, natural hazards such as pot-holes, sea urchins, moray eels, sharp corals, unstable footing, etc., were noted near the surf zones and reef edges. Lava rocks and boulders throughout the shoreline areas were also smooth and slippery.

While no strong ocean current or high surf was noticed during the survey period, these conditions are known to exist along the Wa Pali Coast, especially during the winter months.

A limiting factor to the number of users of this spectacular coastline is accessibility to the area. During the survey, very few people were observed utilizing the coastal waters.

CONCLUSION AND RECOMMENDATION

The Ma Pali coastline rises precipitously out of the sea forming mountainous cliffs, deep valleys and isolated beaches which make this area inaccessible except by foot-trails, boats and helicopters. In addition, high surf and strong current conditions generated primarily during the winter season limit boat access into this area. The natural features and seasonal high surf conditions of the Ma Pali coastline area, therefore, appear to present a self-regulating limitation on the utilization of the area's resources.

During the survey period (June 4th through 8th, 1979) only minimal consumptive use of the marine resources was observed which may have been due to the limited accessibility to the area. Contrary to our expectation of encountering a great diversity and abundance of marine life along this 'remote' coastline area, the overall survey results indicated a rather unimpressive population of marine biota.

In view of the area's self-regulating use limitation and the unimpressive marine life surveyed, we recommend that the present utilization of the marine resources under existing fishery management rules and regulations be continued at this time.

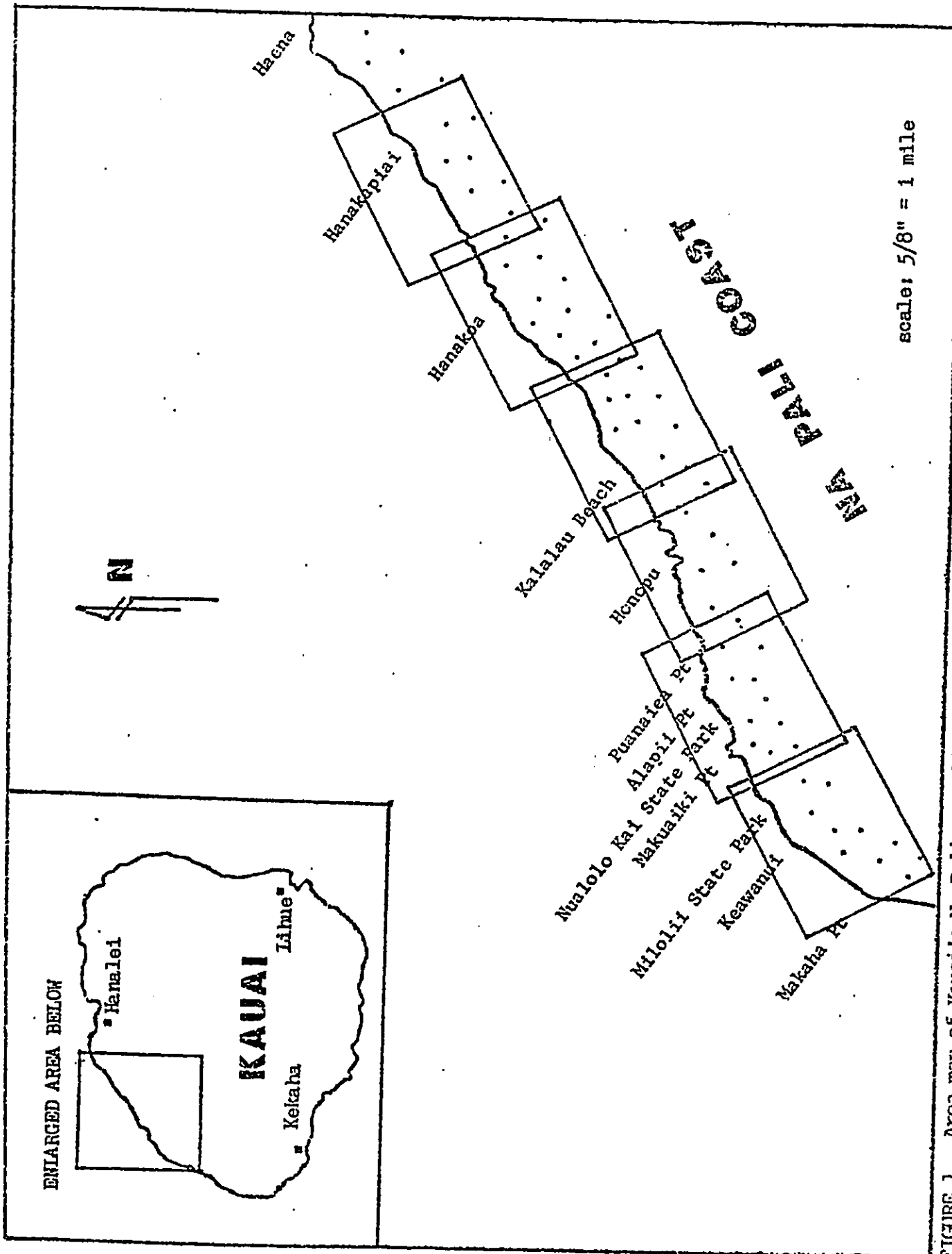


FIGURE 1. Area map of Kauai's Na Pali coastline areas surveyed June 4-8, 1979. Section areas (from Hanakapiai to Makaha Point) as indicated are enlarged on Figures 2, 5, 10, 15, 18, and 21.

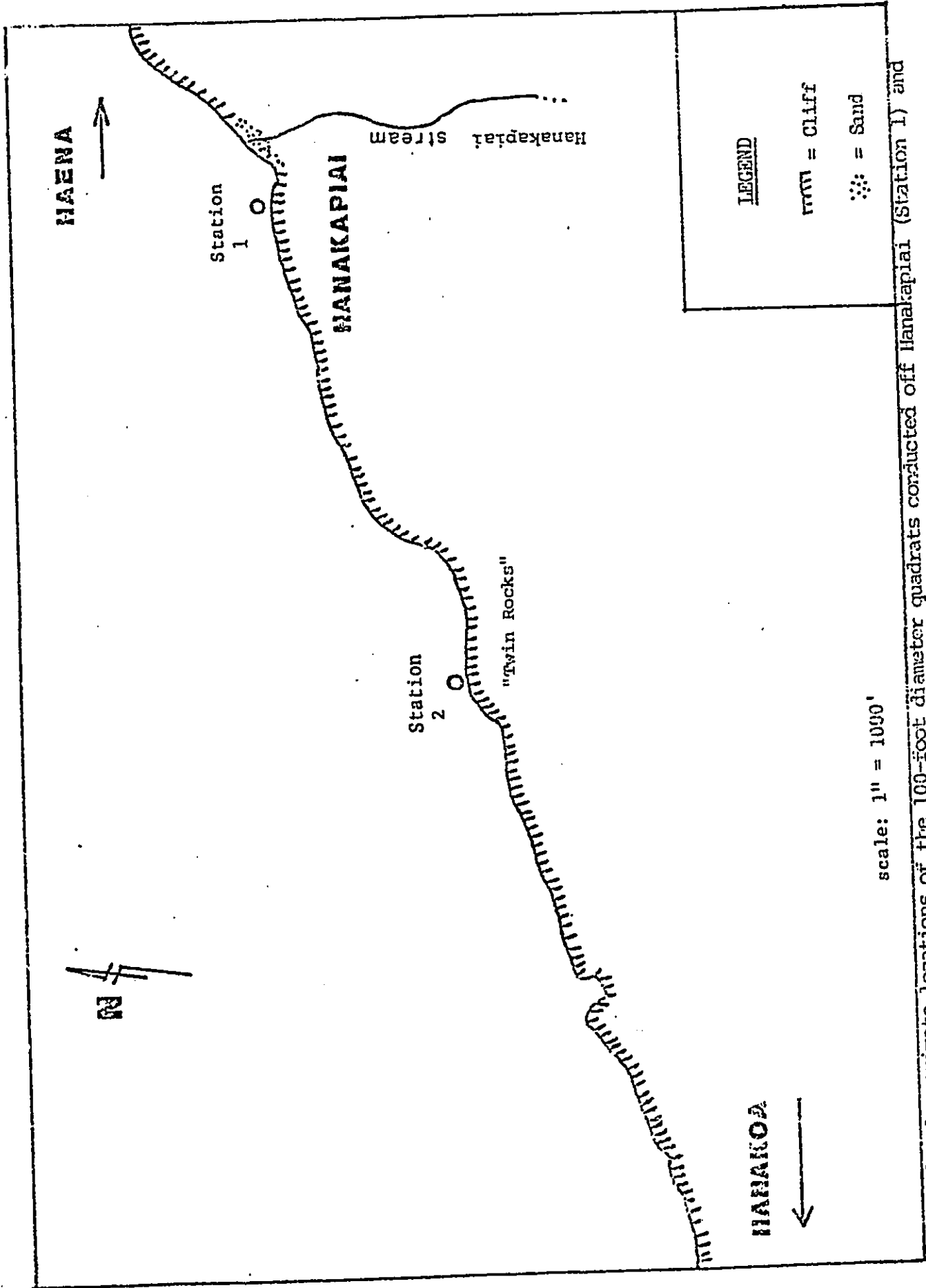


FIGURE 2. Approximate locations of the 100-foot diameter quadrats conducted off Hanakapiai (Station 1) and "Twin Rocks" (Station 2).

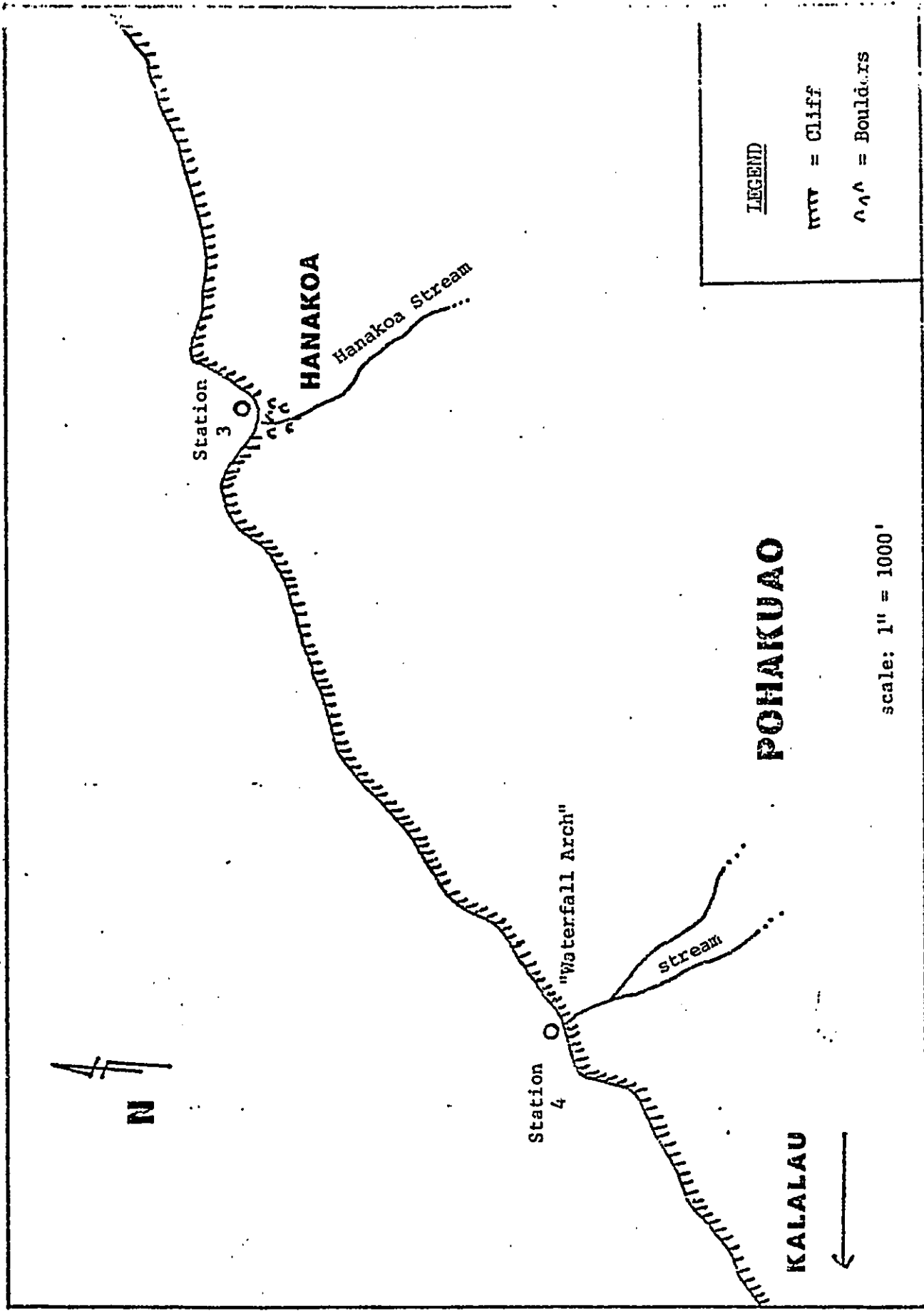


FIGURE 5. Approximate locations of the 100-foot diameter quadrats conducted off Hanakoa (Station 3) and "Waterfall Arch" (Station 4).

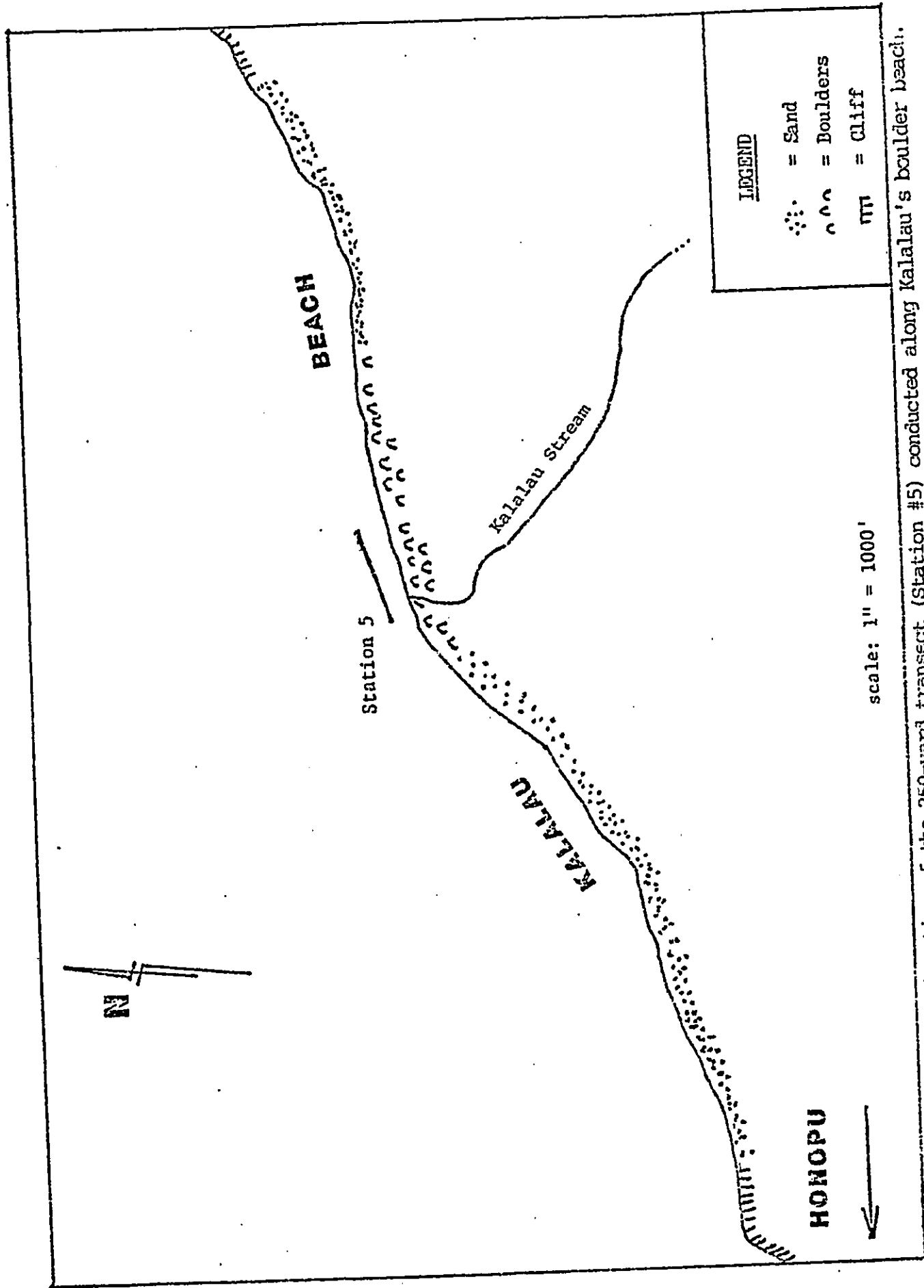


FIGURE 10. Approximate location of the 250-yard transect (Station #5) conducted along Kalalau's boulder beach.

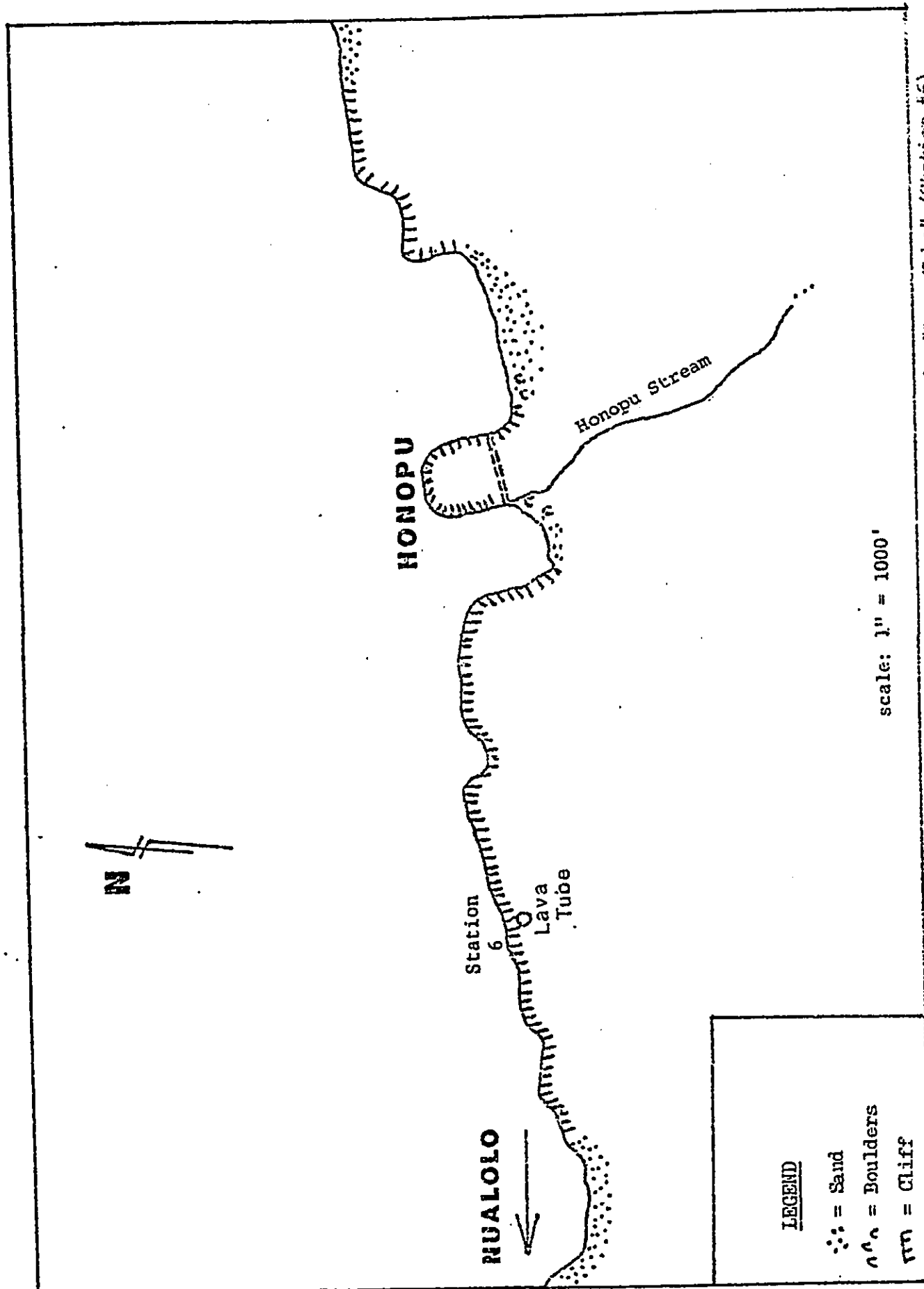
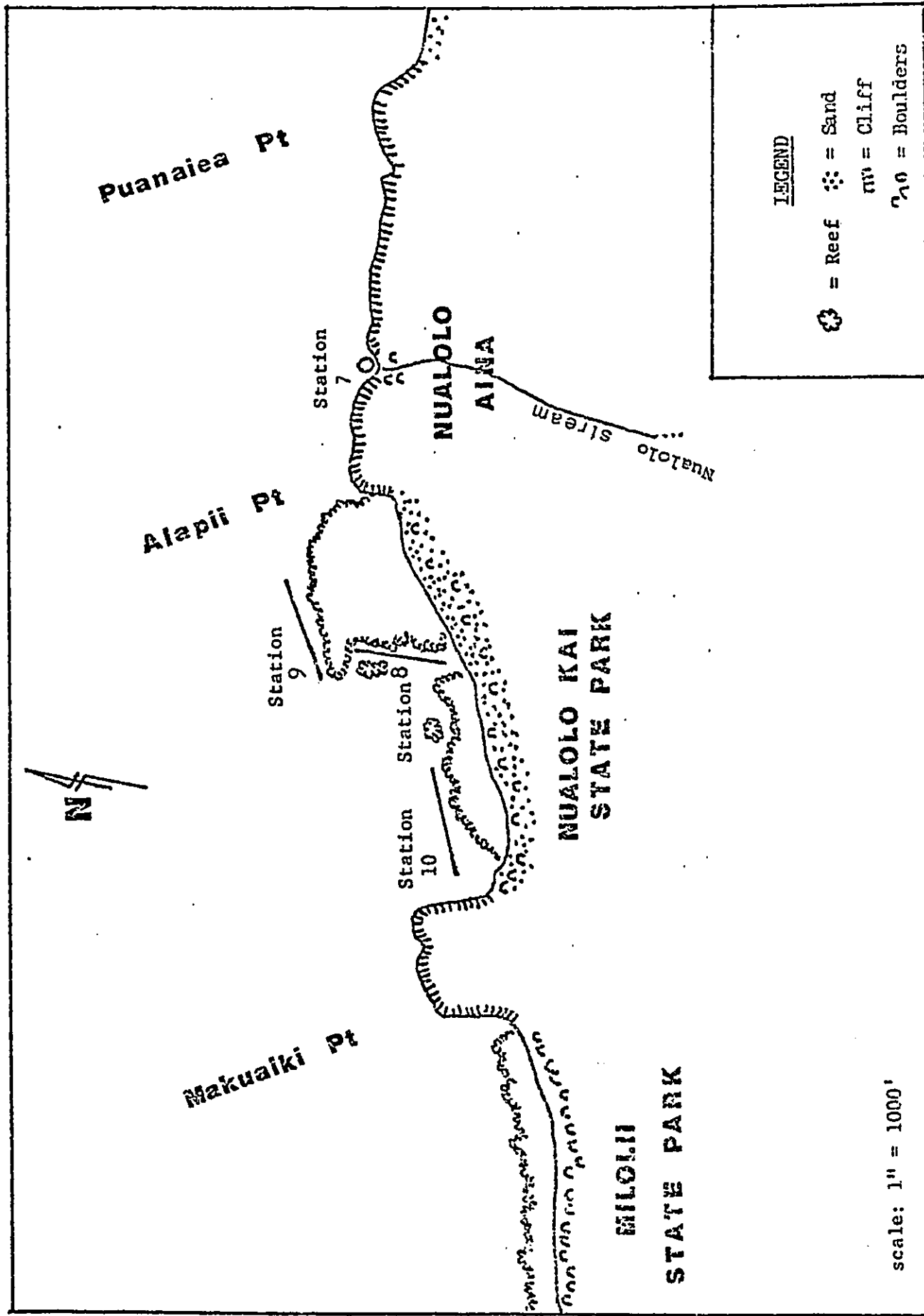


FIGURE 15. Approximate location of the 100-foot diameter quadrat conducted at the "Lava Tube" (Station #6).



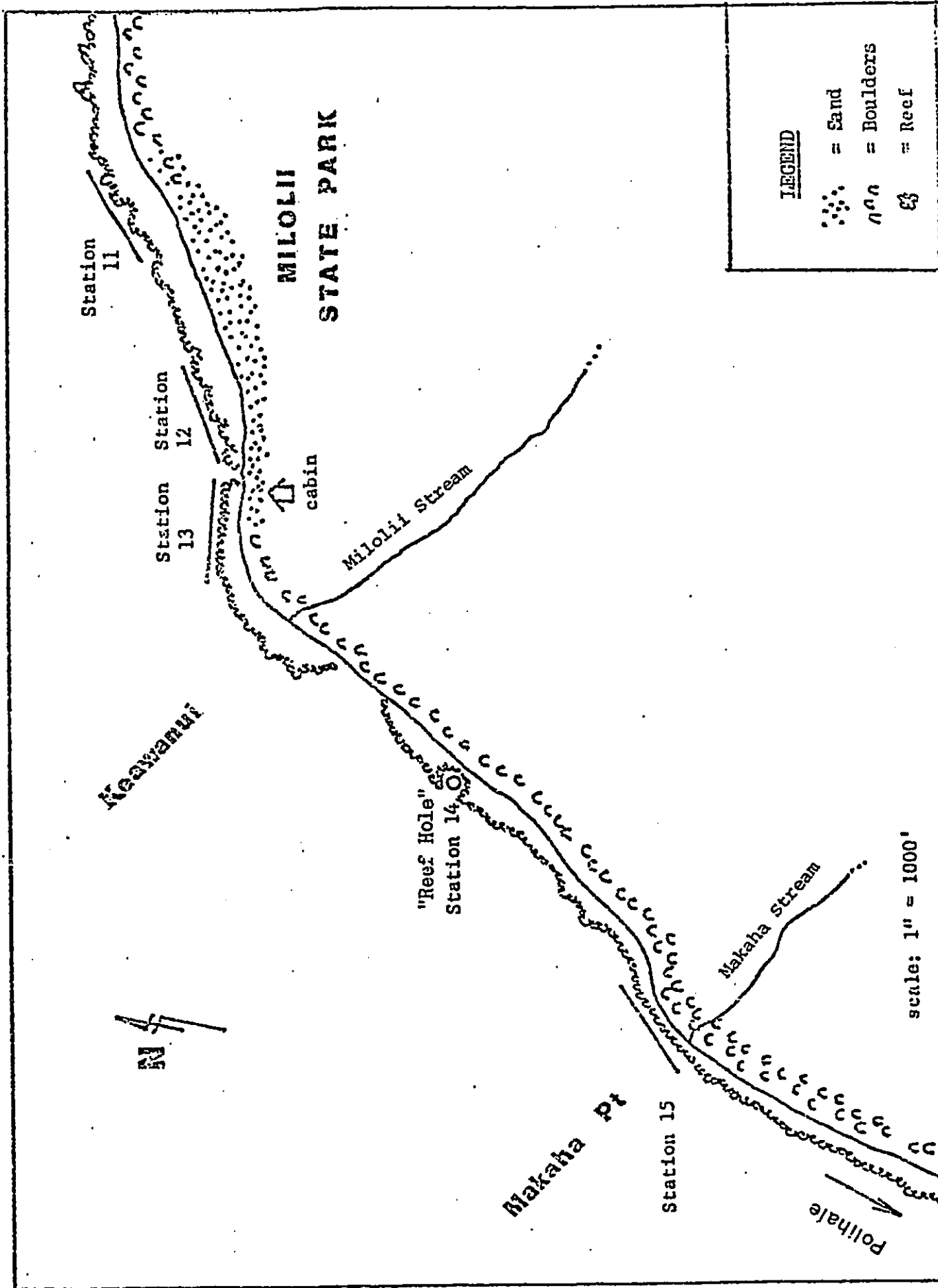


FIGURE 21. Fish transects accomplished included three 250-yard transect stations (Stations 11, 12 and 13) at Milolii, a 100-foot diameter quadrat (Station 14) at "Reef Hole," and a 250-yard transect station (Station 15) off Makaha Point.

TABLE 1. Summary of the fish counts conducted along the Na Pali Coast, Kauai between June 4 and 8, 1979

Station Number	Station Name	Number Species (Rank) Recorded	Number Fishes (Rank) Counted	Estimated Standing Crop (Rank) Calculated in Pounds/Acre
1	Hanakapiai	4 (15)	662 (9)	3,032 (1)
2	"Twin Rocks"	20 (9)	40,151 (1)	1,526 (3)
3	Hanakoa	12 (14)	5,093 (2)	209 (11)
4	"Waterfall Arch"	15 (12)	151 (14)	500 (6)
5	Kalalau	20 (9)	1,251 (6)	48 (15)
6	"Lava Tube"	15 (12)	591 (10)	274 (10)
7	Nualolo Aina	16 (11)	76 (15)	116 (14)
8	Nualolo Kai #1	44 (2)	839 (8)	306 (8)
9	Nualolo Kai #2	59 (1)	3,245 (3)	2,116 (2)
10	Nualolo Kai #3	39 (3)	579 (11)	141 (12)
11	Milolii #1	37 (4)	1,601 (4)	637 (4)
12	Milolii #2	30 (6)	422 (12)	119 (13)
13	Milolii #3	33 (5)	1,231 (7)	293 (9)
14	"Reef Hole"	28 (7)	1,286 (5)	623 (5)
15	Makaha Point	25 (8)	334 (13)	451 (7)
TOTAL:		--	57,512	10,391
AVERAGE:		27	3,834	693

TABLE 2. Species composition and estimated standing crop (in pounds per acre) by species for each of the fifteen fish counts conducted along the Na Pali Coast, Kauai between June 4 and 8, 1979.

SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Gymnothorax flavimarginatus</i>															
<i>G. meleagris</i>								*							
<i>Anlostomus chinensis</i>								*							
<i>Adioryx xantherythrus</i>								*							
<i>Myripristis murdjan</i>									.12						
<i>Priacanthus cruentatus</i>								4.76							
<i>Arogon myleri</i>								.86							
<i>Decapterus marceellus</i>								*							
(= <i>D. pinnulatus</i>)															
<i>Caranx melampygus</i>	2.66														
<i>Lutjanus kasmira</i>	44.85	10.39				11.87									
<i>L. fulvus</i>					.21			.42	11.23					1.48	1.13
<i>Pariparus pleurostigma</i>															
<i>P. porphyreus</i>								.42				.21			
<i>P. cyclostomus</i> (= <i>P. chryserydros</i>)					.07			11.04	4.78	.67	.15	2.65			
<i>P. multifasciatus</i>								.17	6.15	.01			.49		
<i>P. bifasciatus</i>	2.30							.76	1.47	.39	.59	.07	.65	4.88	.06
<i>Kribiax gramboculis</i>								.47	2.35	.94		2.73	13.22	1.94	.25
<i>Rybohus cinerascens</i>								2.23	109.77						
<i>Chaetodon fremblii</i>	7.09	4.22	106.38	6.58			12.31	26.86	371.34	5.50					
<i>C. auriga</i>								*							
<i>C. unimaculatus</i>												.04			
<i>C. lunula</i>															
<i>C. quadrimaculatus</i>								.45	.10			.29			
<i>C. multicinctus</i>					.09			1.03	1.72	.12	.46				
<i>C. millaris</i>									.39		.34	.07	.53	.67	
<i>Abudefduf sordidus</i>								.14							
<i>A. alacranalis</i>	1.51	1.79	3.02	7.16	.59	5.28	.72	2.34	4.94	.09	6.78	4.68		26.83	7.03
<i>Plectrolythichthys imparipennis</i>					.74			.16	2.23		1.12			.35	
(= <i>Abudefduf imparipennis</i>)															
<i>P. sordidus</i>		.07		.07	.02	.17		.03	.73	.01	.03	.15	.05	.05	.15
<i>Stegastes fasciolatus</i>				1.40	.40	.30			.99	.19	3.75	2.97	4.20	1.41	
(= <i>Pomacentrus jenkinsi</i>)															
<i>Chromis vanderbilti</i>							1.08	3.87	9.39	3.96	7.88	7.04	3.96	1.51	5.50
<i>Paracirrhites fosteri</i>									.38					.14	
									.13						

Table 2. (cont.)

SPECIES	Station No.:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<i>Cirrhinus pinnulatus</i>					.28	1.19			.96	1.25	.50	.25	2.60	1.33	2.88	4.19	.50
<i>Cirrhilobus fasciatus</i>					.26								.78				
<i>Bodianus bilunulatus</i>													.03				
<i>Labroides phthirocybaeus</i>		9.44															
<i>Thalassoma duperreyi</i>									.03	1.80							
<i>T. purpuraceum</i>		.53					.63		2.33	4.11	12.95	7.92	5.35	10.71	2.09	1.11	
<i>T. ballieui</i>		10.78	1.25	8.52	4.56	3.54	.64	1.25	1.95	5.58	2.82	1.73	.66	1.67	11.41	1.12	
<i>T. fuscum</i>		3.27		2.63	2.63		.71	3.35	2.63	8.77	1.64	3.00	.97	4.39		2.96	
<i>Gomphosus varius</i>								.82	1.06	4.39	1.76	1.75	1.75	2.94	1.68	.21	
<i>Stethojulis balteata</i>								2.74	.75	20.91	.98	.15	3.76	13.47	3.65		
<i>Acanipses currieri</i>								2.25	.13	.64	.21	.29	.75	.74	1.92		
<i>Opris flavovittata</i>									2.74	1.98	1.98	3.28	4.57	3.95	1.75	5.76	
<i>C. venusta</i>											.02						
<i>Calotocnus spinidens</i>											.14						
<i>Scarus dubius</i>						3.23											
<i>S. perspicillatus</i>															3.01	8.98	2.35
<i>Scorops rubroviolaceus</i>																	
<i>Zanclus cornutus</i> (= <i>Z. canescens</i>)																	
<i>Acanthurus triostegus</i>																	
<i>A. guttatus</i>		2.51	31.63	25.11				3.88	33.32	84.34	7.03	49.98		35.14			
<i>A. achilles</i>								9.15	23.96	289.80	12.94	167.71	11.33	35.75	62.78	13.15	
<i>A. leucoparcus</i>									31.36	249.02			3.14	3.11		10.89	
<i>A. nigrofasciatus</i>									2.70	63.93		.43					
<i>A. nigeris</i>		164.16	84.05	21.12	11.60	61.56	22.16	1.69	61.89	257.90	6.96	89.74	13.75	73.71	140.77	15.25	
<i>A. olivaceus</i>				2.28					8.63	17.24	5.30	4.41	14.90	6.18	11.38	4.47	
<i>A. dussumieri</i>									1.28	4.42	2.13	4.90	1.14	6.40			
<i>A. xanthopterus</i>		331.66	47.22	240.74	3.58	132.66	33.17		11.85	2.02	3.03	21.70	18.43	18.84	66.33	8.68	
<i>A. mata</i>		133.10			16.28				3.58	29.09	4.36			2.23			
<i>Ctenochaetus strigosus</i>												.80					
<i>Zebrafina veliferum</i>									9.58	88.44	14.15	2.05	2.36				
<i>Naso lituratus</i>																	
<i>N. unicornis</i>		310.51			58.44		43.62	19.48	13.85	69.28	4.79	1.34	2.31	4.58	10.20	7.33	
<i>Rhincauthus rectargulus</i>		2.87	1.21	5.76			2.87	1.21	18.28	229.49	9.88		10.84	5.96	145.39	47.04	
<i>R. aculeatus</i>									1.90	7.51	5.87	.73					.50
													1.45				

Table 2. (cont.)

SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Malichthys niger</i>									63.16	19.40	.96				
<i>Pervagor spilosoma</i>							.08								
<i>Cantharines dumerilii</i> (= <i>Anarses dumerilii</i>)							.15		12.34	.51					
<i>Ostracion melanostris</i>									.08	.08	.18	.90	.19		
<i>Canthigaster arborescens</i>					.03	.09		.30	.30	.06	.01		.06		
<i>Plagiobrems goslinel</i>			.01	.01	.94			1.55	1.55	.04					
<i>Cirrhitactes obscurus</i>							.10	.82	.82		.33				
<i>Exallia brevis</i>					7.39	.98	5.59	2.66	2.66		4.79		.65	12.42	
<i>Kuhlia sandwicensis</i>	11.29				.41	3.21					*				
<i>Forattilloides delicatulus</i>	.16	456.92	7.76												
<i>Mugil certalus</i>															
<i>Nocomatus leuciscus</i> (= <i>N. cheptalii</i>)	3,013.80						8.92								
<i>Polydactylus sexfilis</i>				*											
<i>Pranessus insularum</i>															
<i>Famulinus marginatus</i>									*		*		*	*	*
<i>P. penicillatus</i>															
<i>Polypus harroratus</i>									*		*		*	*	*
<i>Chelonia ridgwayi</i>															

*Species observed

APPENDIX F

State of Hawaii
Department of Land and Natural Resources
DIVISION OF FISH AND GAME

Survey of the Freshwater Aquatic Fauna in the Na Pali
Coast Streams, Island of Kauai

INTRODUCTION

A three day survey of the aquatic macrofauna in the Milolii, Nualolo Aina and Kalalau Streams was accomplished during the week of June 4-6, 1979. Since surveys of other Na Pali streams scheduled for later that summer could not be accomplished, relevant data on the Hanakapiai and Hanakoa Streams has been extracted from a report titled "Distribution and Relative Abundance of the Endemic Freshwater Goby, Lentipes concolor, in Hawaii" by the Hawaii Cooperative Fishery Research Unit (A.S. Timbol, A.J. Sutter, J.D. Parrish), April, 1979 - May, 1980 to complete the coverage.

The Division of Fish and Game segment of the stream surveys was conducted by Stanley Shima, Aquatic Biologist, Freshwater Section in conjunction with the marine fish survey.

OBJECTIVES

To assist the Division of State Parks with the development of a resource management plan for the Na Pali Coast by conducting a qualitative and quantitative assessment of the aquatic macrofauna in some of the major perennial streams.

PROCEDURES

Surveys of stream macrofauna were conducted entirely by snorkeling and observations were recorded on underwater transect slates. There were no attempts to collect specimen samples or to record physical and chemical parameters of the streams.

The Milolii Stream was the most accessible, just a few minutes walk from the cabin in which the entire survey party was lodged. The Kalalau and Nualolo Aina Streams were approached by a zodiac (inflatable boat) operated by the marine fish survey team and each required a well timed offshore drop off and scramble through the shorebreak.

FINDINGS AND DISCUSSION

The entire lower section of the Milolii Stream was investigated from the mouth to the base of the high waterfall at the head of the valley, a distance of about 0.80 miles. The whole section was so heavily covered over with silt that pools and riffles were completely obliterated. Visibility was zero, maximum stream depth less than a foot and the banks knee deep with silt. Fish survival under these conditions appeared impossible and none were encountered. However, a few atyid shrimp (Atya bisulcata) were seen in two trickling springs located away from the main stream. The source of the silt was reportedly from road construction activities along Milolii Ridge.

Six faunal species were encountered in the Kalalau Stream and five in the Nualolo Aina Stream. The relative abundance and distribution of these species are shown in Table I and Table II and included: 1) copu nopili (Sicydium stimpsoni, a goby), 2) copu nakea (Awaous stamineus, a goby), 3) lentipes (Lentipes concolor, a goby), 4) atyid shrimp (Atya bisulcata), 5) the introduced prawn lar (Macrobrachium lar) and 6) wi (Neritina granosa, a native mollusk). Wi was found only in the Kalalau Stream and of the six species encountered, only the lar is non-native. The species composition of these high natural quality streams represents an excellent cross section of the Hawaiian freshwater macrofauna.

Table III from the report by the Hawaii Cooperative Fishery Research Unit shows the relative abundance of the aquatic macrofauna collected by electroshocking in the Hanakapiai and Hanakoa Streams. Species composition for these streams was the same as the Kalalau and Nualolo Aina Streams and were at comparable levels of abundance. Notably absent, however, was the wi, known to occur in these streams but probably unaffected by the electroshocker and thereby not collected.

SUMMARY AND CONCLUSIONS

The four streams surveyed (Milolii excluded) are the largest and most visible of the dozen or more perennial streams along the Na Pali Coast. They are independent streams possessing a high natural quality and a rich diversity of native macrofauna. Of these, the goby, copu nakea, atyid shrimp, wi and more recently, the prawn M. lar are popular food items for some local ethnic groups. In general, population densities of these species were relatively low, comprised primarily of small immature animals. The disproportionately high ratio of juveniles to adults strongly suggests some degree of regular harvesting, probably on a subsistence level by campers to supplement their provisions. It appears inevitable therefore that consumptive use of this resource at present or higher rates will eventually threaten their survival in these streams.

The value of these streams, then, appears to lie not with the consumptive use of the macrofauna, but rather with their scientific, educational and recreational (aesthetic) values as living showcases of our Hawaiian freshwater biota, consistent with the wilderness experience theme of the Na Pali Coast State Park resource management plan.

Prepared by:

Stanley Shima

STANLEY I. SHIMA
Aquatic Biologist

TABLE I. Aquatic Organisms Observed in Kalalau Stream, Kauai, June 6, 1979

Transect site & Elevation	Distance From Mouth	No. of Pools Checked	SPECIES					
			Nopili	Nakea	Lentipes	Atyid*	Lar	Wi
1000'	1.7 mi.	3 consecutive	2	0	0	fair	0	4
700'	1.2 mi.	4 consecutive	2	0	0	abundant	0	0
40'-120'	50-300 yds.	12 consecutive	95	13	8	few	3	10
1st tributary	0.20 mi.	4 consecutive	15	4	10	fair	3	0
TOTALS:		23	114	17	18	Fair	6	14

TABLE II. Aquatic Organisms Observed in Nualolo Aina Stream, Kauai, June 6, 1979

Transect site & Elevation	Distance From Mouth	No. of Pools Checked	SPECIES					
			Nopili	Nakea	Lentipes	Atyid*	Lar	Wi
600'	1.25 mi.	3	23	1	8	few	0	0
400'	.75 mi.	2	32	9	13	few	10	0
30-100'	50-200 yds.	3	55	8	5	few	6	0
TOTALS:		8	110	18	26	few	16	0

*Atyid: Few = <100/pool
 Fair = >100/pool
 Abundant = >500/pool

TABLE III. Relative Abundance* of Aquatic Macrofauna Collected by Electroshocking in the Hanakapiai and Hanakoa Streams, Kauai (from Hawaii Cooperative Fishery Research Unit, June, 1980).

Stream	SPECIES				
	Nopili	Nakea	Lentipes	Atyid	Lar
Hanakapiai	abundant	common	abundant	very abundant	common
Hanakoa	abundant	common	very abundant	very abundant	common

*Legend for species abundance:

- a) common = 2 to 5 animals/quadrat (20 sq. meters)
- b) abundant = 6 to 10 animals/quadrat (20 sq. meters)
- c) very abundant = 11 to 100+ animals/quadrat (20 sq. meters)

Appendix G

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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THE REGION

The Island of Kaua'i, with a total area of 553 square miles (State of Hawaii, 1977, 75) is fourth largest in size. One of the oldest of the major islands in the state, Kaua'i has a number of climatic and geological features that are of state-wide and national significance. For instance, Wai'ale'ale, (elevation 5,148 feet) is one of the wettest places on earth, with an average annual precipitation of 486 inches. Waimea Canyon on the west side of the island, has the distinction of being known as the "Grand Canyon of the Pacific". Another distinctive feature of the island is its Nā Pali (the cliffs) Coast on the northwest shore. Here, steep wave-cut sea cliffs extend to elevations of 1,400 to 4,000 feet. Only on Molokai, where a spectacular cliff forms the north coast of the island, are the sea cliffs of Nā Pali surpassed in height.

The population of Kaua'i, which in 1940 reached 35,636, is estimated at 31,800 in 1975, or 3.7% of the State's population. This represents a 6.8% increase in population from the 1970 census (State of Hawaii, 14). Nearly 7,000 people resided in the urban places of Kapa'a and Lihu'e in 1970. The principal industries are agriculture, tourism, and government employment.

The district of Hanalei encompasses Hā'ena and most of the Nā Pali Coast. A study conducted by the center for Nonmetropolitan Planning and Development (Anderson, Vieth, Seidenstein, and Bradshaw, 1975, 37) revealed that the Hanalei census tract (which is the same as the district of Hanalei) experienced phenomenal growth while others have shown a slight decline. This census tract, with a 1974 population of 1700 is distinctive when compared with the other census tracts. For example, the median age of residents in Hanalei tended to be lowest (23.7 years) of all census tracts (as compared to 35.3 years for the Kaumakani-Hanapepe Census Tract and 27.1 years for the Island). Concerning the length of residency, those in Hanalei scored a median of only 14.4 years, whereas half of Kaua'i's adults have been residents for at least 27.7 years. Although 53.6 percent of Kaua'i's adult population were born on Kaua'i, this was true of only 36.8 percent of the Hanalei Census Tract compared, for example, to the high of 63.9 percent in the Lihu'e Census Tract (Anderson, Vieth, Seidenstein, and Bradshaw, 39).

HĀ'ENA AND THE NĀ PALI COAST

TOPOGRAPHY - Hā'ena is situated at the terminuses of two distinct physiographic regions (Figure 2). A narrow band of coastal lowland extends from the east end of Hanalei Bay westward to Hā'ena State Park. The local relief of this relatively level section of

the study area is approximately 25 feet due to the presence of sand dunes along its seaward edge. Directly to the southwest of Hā'ena is the Nā Pali Coast, a region characterized by steep cliffs and valleys extending over a straight-line distance of 14 miles. Elevation range from sea level to 4,000 feet along the rim of Kalalau Valley.

Local relief tends to be greater along the section of the pali west of Kalalau Valley. In some areas, the change in elevation exceeds 6,000 feet per mile.

Numerous streams have carved approximately 22 major valleys along the cliffs. Nearly 25% of these are perennial streams which tend to be located on the eastern half of the coast from Kalalau to Hā'ena. The largest valleys are Kalalau, Hanakāpi'ai, Hanakoa, Honopū, Nu'alolo, Mākaha, and Kauhao. Kalalau and those valleys to the east tend to be broader with greater flood plain development than those to the west owing to the more rapid erosional process associated with increased precipitation along the eastern section of the pali.

Deposits of coral sand and cobbles are present in the lowlying coastal areas of Hā'ena, Kalalau, Honopu, a section east of Puanaiea Point, Nu'alolo Kai, and Miloli'i.

GEOLOGY

Volcanism - Kaua'i, one of the oldest of the high islands in the Hawaiian Archipelago, consists of a single shield volcano, built up from the sea floor by thousands of thin flows of basaltic lava. The lava flows and associated pyroclastic rocks that were deposited on the flanks of the main Kaua'i shield volcano, are referred to as the Napali formation of the Waimea Canyon volcanic series (Macdonald, Davis, and Cox, 1960, 1). The Napali formation consists of thin flows of tholeiitic basalt, olivine basalt, and oceanite pāhoehoe and a'a that slope gently outward in all directions from the summit area (Macdonald and Abbot, 1970, 384). Extensive and spectacular exposures of these rocks are found along the Nā Pali Coast, hence the name Napali formation. The exact age of the formation is not known, however, the portion exposed above sea level was most probably formed during the Pliocene epoch of the Tertiary period (Macdonald, Davis and Cox, 23).

Hundreds of dikes are exposed in the cliffs and canyons along the Nā Pali Coast, many undoubtedly reached the surface and contributed to the Nā Pali flows. These dikes prevent the occurrence of large bodies of basal ground water. Except where dikes impound the ground water at high levels the lavas of the Napali formation are saturated at and near sea level with basal water. The basal water is fresh throughout much of the island, but it may be brackish at nearshore areas in drier parts of the island (Macdonald, Davis, and Cox, 32).

Considerable quantities of ground water are discharged near sea level from springs along the coast. This flow of water, however, is largely from dike compartments that have been breached by marine erosion and into which high-level ground water moves from adjacent inland compartments. Some streams in Kalalau Valley are fed by high level ground water impounded by the relatively impermeable breccia of the fault which trends northeastward across the valley (Macdonald, Davis, and Cox, 124). Along the coast from Awa'awapuhi Valley to Polihale, the basal water escapes through sea-level springs where the lava flows are exposed at the shore. These basal water heads probably are low and are a portion of the extensive body of basal water contained in lavas of the Napali formation in the area west of Waimea Canyon (Macdonald, Davis, and Cox, 140).

Other geologic formations to be found along the coast include masses of breccia near the head of Nu'alolo Valley, and probable fillings of pit craters in the southeast wall of Honopū Valley 0.3 to 0.5 miles above the trail on the southwest wall of Ho'olulu Valley, 3.5 miles southwest of Hā'ena. Thin films of ash and red ashy soil are found between the lava flows (Macdonald and Abbot, 384, 385).

Wave erosion - The Nā Pali Coast is not a fault scarp as some commonly believed. As the island submerged, the great sea cliffs were caused by marine erosion of the interstream divides composed of the weak lavas in the lower member of the Waimea volcanic series. Between Hā'ena and Kalalau Valley, the resemblance of the cliffs to that of a fault-line scarp is due to the difference in strength of the rock in the caldera and the extra-caldera members of the Waimea volcanic series. The lower member was eroded and the sea was held back by the massive, wave-resisting upper member of the series (Stearns, 1967, 89).

Sea caves, evident all along the coast, are the result of mechanical and chemical weathering of less resistant rocks by the surf.

Stream erosion - Tropical weathering and erosion by running water are exhibited on the Nā Pali Coast, whose curtain-like folds are one of the most outstanding in the State. Differences in density and thickness of the rock layers leads to different rates of erosion. Similar to wave erosion, streams will erode the softer layers first, but will eventually cut into harder layers. Typically, a series of plunge pools are formed by the stream where water runs nearly vertically in places where soft rock is eroded, and flows move horizontally over harder layers. Thus, a series of "hanging valleys" can be formed (Carlquist, 1970, 51).

The following is a more detailed description of the geology of two sites in the planning area - Hā'ena and Kalalau Velly, as stated by Macdonald, Davis, and Cox (1960, Plate 2):

Haena - The high cliffs at the inner edge of the narrow shore platform are sea cliffs cut in lavas of the Waimea Canyon volcanic series. The dry and wet caves at the base of the cliff are ancient sea caves cut by wave erosion. The mouth of the high wet cave is partly blocked by talus fallen from the cliff above. In the cliff near the dry cave several prominent dikes are exposed. The lava flows in the cliffs are mostly pāhoehoe, but some are 'a'a. A narrow fringing coral reef lies offshore. The water in the wet caves is basal ground water, standing a little above sea level, held back by dams of relatively impervious alluvium and talus across the front of the caves. The tsunami of April 1, 1946, did heavy damage at Haena. The wave swept in to heights as much as 45 feet above sea level, wrecking homes, and taking several lives. From the end of the highway at Haena, a difficult 8-mile trail leads southwestward along the Napali Coast to Kalalau Valley.

Kalalau Lookout - From an altitude of 4,000 feet, one looks down Kalalau Valley to the sea. The valley is approximately 2 miles across and 2.5 miles long. The walls of the valley are in lava flows of the Waimea Canyon volcanic series, cut by several dikes. At the head of the valley an unconformity separates distinctly dipping lavas on the seaward side from more nearly horizontal lavas on the inland side. The unconformity lies along one of the outlying faults associated with the caldera of the ancient volcano. The water of the high waterfalls on the east wall of the canyon issues at springs along the fault.

CLIMATE

Rainfall - On the northwest coast of Kaua'i, as in most of Hawai'i, there are only two seasons: "summer", from May to October; and "winter", from October to April. During the summer months, the trade winds which originate from the Pacific High Pressure cell to the northeast of Hawai'i, are most persistent, and the weather warmer and drier. During the winter months, the Pacific High migrates southward following the seasonal shift of the sun, and the storm tracks move closer to the state. The trade winds may be interrupted for days at a time by the invasion of fronts, migratory cyclones, and Kona storms. The graph of monthly precipitation (Figure 3) and the following Table 1 of total precipitation and departures from normal for selected meteorological stations on Kaua'i help to illustrate the increase in precipitation during the winter months. While there are no rain gauges in the Nā Pali area, the average annual rainfall in Kalalau valley is from 50 to 75 inches, as interpolated from Figure 3.

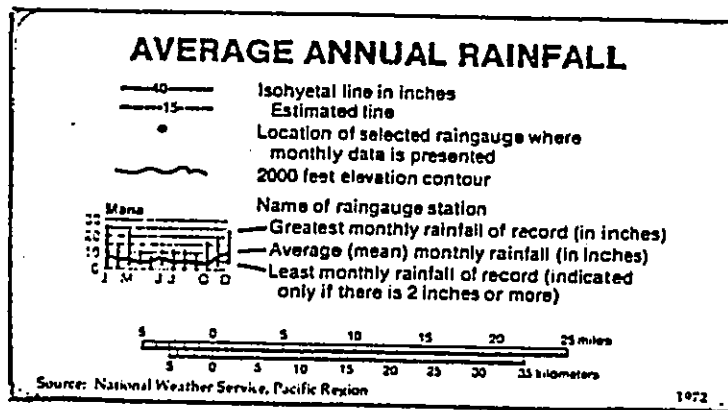
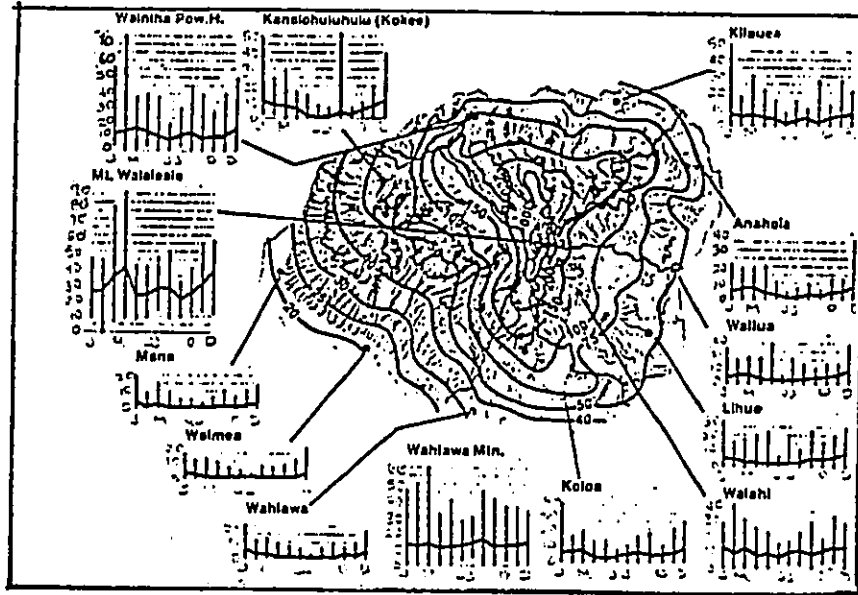


FIGURE 3
AVERAGE ANNUAL RAINFALL FOR KAUA'I

Source: University of Hawaii, Department of Geography, Atlas of Hawaii, 1973.

Table 1. Total Precipitation and
Departures from Normal (In Inches)

Station: PH Wainiha 1115

<u>Month</u>	<u>Precipitation</u>	<u>Departure</u>
January	13.84	.83
February	12.53	.04
March	27.71	12.38
April	19.46	6.88
May	4.85	- 4.47
June	3.01	- 2.65
July	5.97	- 4.03
August	5.19	- 3.51
September	3.22	- 1.95
October	5.13	- 3.80
November	5.35	- 6.78
December	3.08	-11.23
Annual	109.34	-18.29

Station: Princeville Ranch 1117

<u>Month</u>	<u>Precipitation</u>	<u>Departure</u>
January	9.51	.70
February	7.83	.70
March	13.81	3.22
April	10.24	2.75
May	3.81	- 2.97
June	2.90	- 1.69
July	6.70	.32
August	4.57	- 1.74
September	3.98	- .27
October	2.92	- 3.72
November	2.63	- 6.85
December	2.48	- 7.00
Annual	71.38	-16.55

Source: U.S. National Oceanic and Atmospheric Administration,
Climatological Data, Annual Summary, Hawaii and Pacific, 1976.
Table 2.

According to climatologist Saul Price, twenty-year climatic records indicate that an average of two to three dangerous storm wave conditions may occur five or six times annually during the winter months of October through April. Periods of smaller waves do not pose a serious threat, but do affect the conditions under which water-oriented recreation is engaged. Storms well to the north may cause rough ocean conditions, yet at the same time, the weather at Hā'ena maybe fine. Hā'ena, situated to the north, is more vulnerable than Polihale to the southwest, where storm waves have caused damage to facilities in the past (Price, personal communication, 01 September 1977).

Orographic Precipitation - Trade winds are laden with moisture when they encounter the islands. Along the Nā Pali Coast, the trades are confronted by steep cliffs which forces them to rise rapidly upward. Most of the precipitation resulting from this orographic effect occurs on the leeward side of the summit ridge (Figure 3).

Rainshadow Effect - The relative dryness of the southwestern portion of the Coast can be attributed to the rainshadow effect on a series of sharp ridges lying perpendicular to the trade winds. As trade winds rise sharply up a ridge, most of the condensation caused by this rise falls on the lee side, beyond the edge of the ridge. For example, the eastern side of Kalalau Valley is wet, and covered with trees and shrubs. The western side of Kalalau Valley, although facing the trade winds, is covered only with grasses. The same occurrence is found in valleys farther east, such as Honopū and Awa'awapuhi (Carlquist, 71).

Temperature - While there are no meteorological stations along the Nā Pali Coast, general temperatures along the coast can be inferred from stations located outside the study area. Kilauea Point station 1133, located on the north shore, recorded an average annual temperature of 75° F for 1976. The range was from an average monthly low of 70.8° in March to an average monthly high of 78.8° in September. At the Mana station 1026 to the southwest of the Coast, the average annual temperature was 74.1°. The lowest average monthly temperature for February was 70.4°, and the highest average monthly temperature was 78.3° in September. (U.S. National Oceanic and Atmospheric Administration, Table 1).

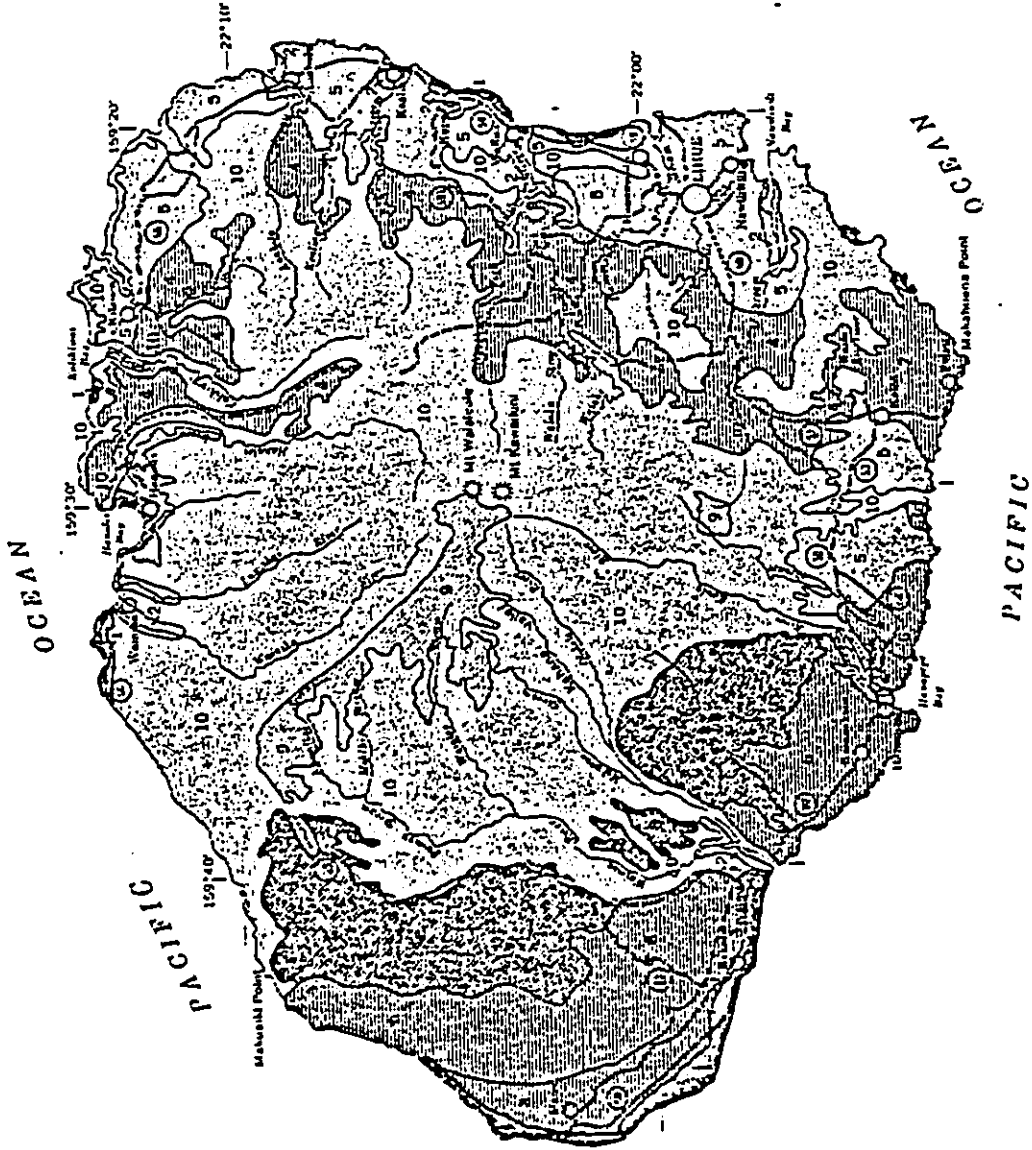
SOILS

Cliffs - Soil classification along the Nā Pali Coast is difficult to determine due to the rugged terrain. The Soil Survey of the Soil Conservation Service (1972, 119) indicates that Rock Outcrop (rRO) consists of areas where exposed bedrock is exposed over more than 90 percent of the surface. The rock outcrops are mainly basaltic and andesite. All of the steep palis are classified as rRO (Figure 4).

FIGURE 4
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 UNIVERSITY OF HAWAII AGRICULTURAL EXPERIMENT STATION

**GENERAL SOIL MAP
 KAUAI ISLAND, HAWAII**

Scale 1:753,400
 0 1 2 3 4 Miles



SOIL ASSOCIATIONS

- 1** **Maunaloa** association: Deep, newly level to moderately steep, excessively drained and well-drained soils that have coarse-textured underlying material; on coastal plains
- 2** **Maunaloa-Kohala** association: Deep, newly level, poorly drained to well-drained soils that have dominantly moderately fine-textured to medium-textured subsoil in underlying material; on bottom land
- 3** **Kakahaione** association: Deep, newly level, well-drained and poorly drained soils that have a fine-textured subsoil; on coastal plains
- 4** **Kaunaloa** association: Deep, newly level to steep, well-drained and moderately well-drained soils that have a fine-textured or moderately fine-textured subsoil; on uplands
- 5** **Lihue-Pala** association: Deep, newly level to steep, well-drained soils that have a fine-textured or moderately fine-textured subsoil; on uplands
- 6** **Makalei** association: Deep, gently sloping to steep, well-drained soils that have a dominantly moderately fine-textured or fine-textured subsoil and shallow, steep and very steep, well-drained soils over basalt bedrock; on uplands
- 7** **Waialeale** association: Moderately deep, gently sloping, well-drained upland soils that have a moderately fine-textured or fine-textured subsoil; deep, newly level, poorly drained, bottom land soils that have a fine-textured subsoil
- 8** **Rough broken land** association: Shallow to deep, very steep, rough broken land and deep, moderately sloping to very steep, well-drained soils that have a medium-textured to fine-textured subsoil; on uplands
- 9** **Waialeale-Akaka** association: Moderately deep, very steep, somewhat poorly drained soils that have a moderately fine-textured subsoil and level to moderately steep, very poorly drained organic soils over fine-textured material; on uplands
- 10** **Rough maintained land** association: Rough broken land (Rock outcrop association). Well drained to excessively drained, very steep to precipitous lands of mantles and spilloes

January 1971

NOTE -
 This map is intended for general planning.
 Each definition may contain soil, being relatively different from those shown on this map.
 Use detailed soil maps for operational planning.

Rubble land (rRU) is applied to some nearshore areas, such as Milolii State Park and portions of Nualolo Kai State Park. According to this classification, stones or boulders cover 90 percent of the surface. It occurs at the base of very steep to precipitous slopes at elevations of sea level to 500 feet. The annual rainfall amounts to 22 to 50 inches (U.S. Department of Agriculture, 119).

Beach - The major accumulations of beach sand is at the valley mouths of Nu'alolo Kai, east of Puanaiea Point, Honopu, Kalalau, Hanakapi'ai, and Ke'e Beach.

Valley - Kalalau Valley, located midway along the coast, is the broadest and the only valley in the study area whose soil types have been described and mapped in the Soil Survey. The dominant soil type was of the Hanama'ulu Series. Found in the central portion of the valley floor, Hanama'ulu bouldery silty clay (HuE) are well drained soils on stream terraces and steep terrace breaks. The surface layer of very dark, gray-brown, silty clay with boulders is approximately 11 inches thick. The subsoil consists of dark-brown and dark reddish-brown subangular blocky silty clay or silty clay loam. It extends down for about 60 inches. The substratum consists of weathered pebbles, stones, and boulders washed from upland soils. Runoff is medium to rapid, and the erosion hazard is moderate to severe. The suitability of this type of soil as a topsoil is fair with low fertility, and many boulders. There are severe limitations of this soil for septic tank filter fields as slopes exceed 15 percent and are bouldery.

Rough Mountainous Land (rRT) occurs at the head of Kalalau Valley. It consists of very steep land broken by intermittent drainage channels. The soil layer is very thin. The land surface, with local relief exceeding 500 feet, is dominated by deep valleys with steep slides. This land type is used for water supply, wildlife habitat, and recreation.

The flat, coastal area on the eastern side of the valley floor is composed of Lualualei extremely stony clay with slopes of 3 to 35 percent (LPE). These soils occur on talus slopes and exhibit moderate to severe erosion hazards, and runoff flows of medium to rapid.

Other soil types of smaller area are: Mokule'ia fine sandy loam (Mr) fringing the beach, Blown-Out Land, and Rough Broken Land. Portable pit comfort stations presently are located on the well-drained Mokule'ia soils. These soils, located along coastal plains, are formed on recent alluvium deposited over coral sand. Permeability is moderately rapid in the surface layer and rapid in the subsoil. Runoff is slow, and the erosion hazard is slight.

Table 3. Tsunami Wave Heights
Along the Na Pali Coast

Location	Latitude	Longitude	Years occurred				
			1946*	1952	1957**	1960***	1964
Hā'ena			--	--	1.6	--	--
near Haena Pt.	22° 13.55'N	159° 33.75'W	9.7	--	10.3	--	--
	22° 13.25'N	159° 34.1'W	13.7	--	--	4.1	1.7
	22° 13.3'N	159° 34.25'W	--	--	8.8	--	--
	22° 13.4'N	159° 34.4'W	--	--	--	1.9	--
near Ka Lae o Kailio	22° 13.4'N	159° 34.95'W	4.2	--	--	--	--
	22° 13.25'N	159° 35.2'W	7.3	--	8.5	2.8	--
	22° 13'N	159° 35.5'W	9.1	--	--	--	--
Mouth of Hanakapiai Stream	22° 12.55'N	159° 36'W	6.4	--	--	--	--
Hanakoa Stream	22° 11.7'N	159° 37.6'W	3.0	--	--	--	--
Kalalau Stream	22° 10.65'N	159° 39.3'W	3.6	--	--	--	--
near Makuaiiki	22° 09.3'N	159° 42.65'W	6.0	--	--	--	--
Keawanui	22° 09'N	159° 43.5'W	5.4	--	--	--	--

*1946 Tidal wave origin in East Aleutian Islands with magnitude of 7.4 on the Gutenberg and Richter Scale. Shallow depth of earthquake.

**1957 Tidal wave origin in Andreanof Island, Aleutian Islands with a magnitude of 8.3 P.A.S.

***1960 Tidal wave origin in South Chile with a magnitude of 8.5 P.A.S.

Note: Height = maximum run-up height or amplitude in meters.

Source: Pararas - Carayannis, Catalog of Tsunamis in the Hawaiian Islands, 1967.

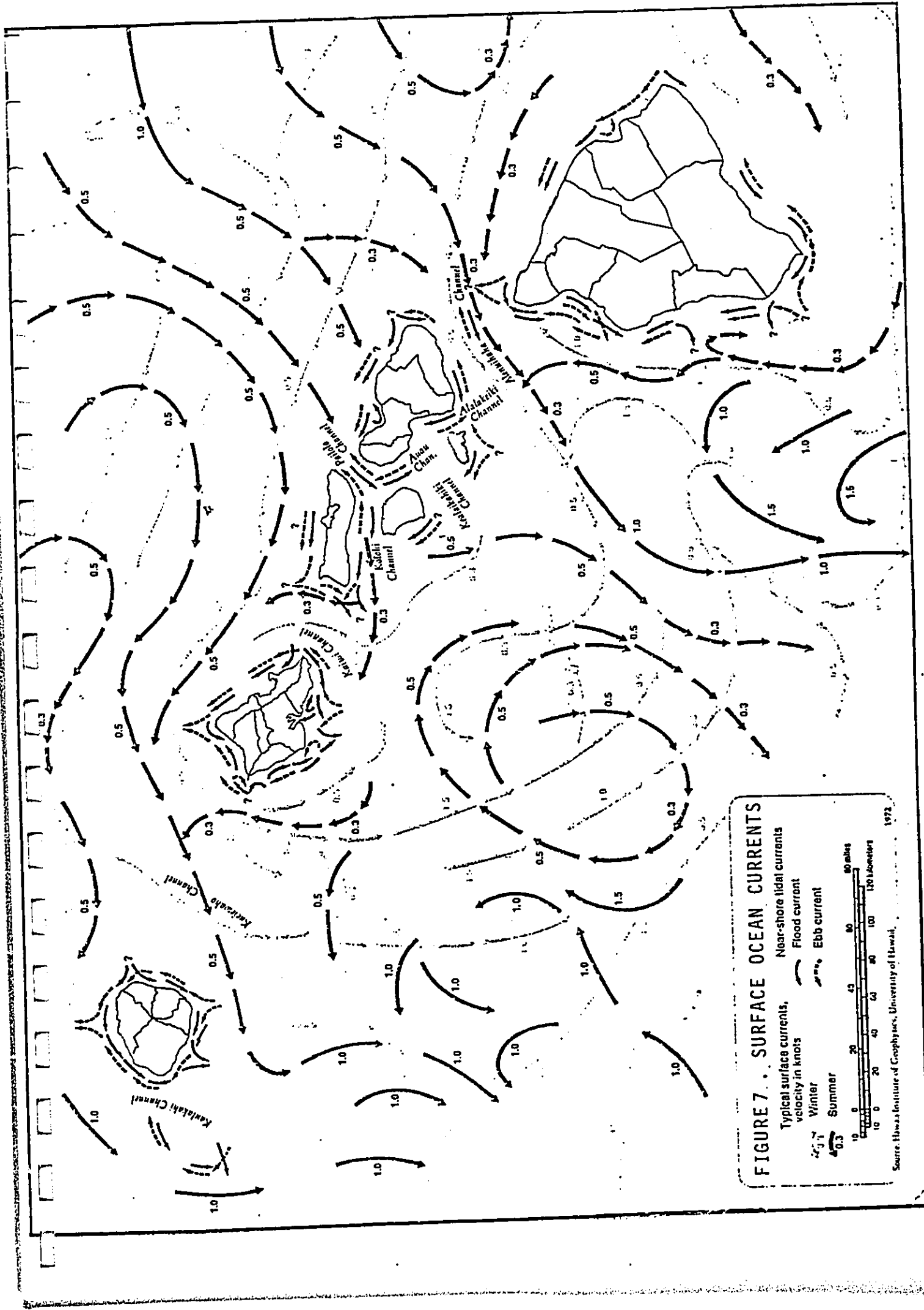


FIGURE 7. SURFACE OCEAN CURRENTS
 Typical surface currents, Near-shore tidal currents
 velocity in knots Flood current
 Winter Ebb current
 Summer
 0 10 20 30 40 50 60 nautical miles
 0 20 40 60 80 100 kilometers
 Source: Hawaii Institute of Geophysics, University of Hawaii, 1972.

Source: University of Hawaii, Department of Geography, Atlas of Hawaii, 1973.

HAZARDS

The possibility of damage to property and life is increased in rugged areas such as the Nā Pali Coast where narrow, dirt trails wind around cliffs with slopes greater than 45°, and popular beach areas remain unprotected from inundation by water originating over land or from the sea. The hazards include: inundation of valleys and other lowland areas by tsunamis, storm waves, and stream flooding; tornadoes or hurricanes; and mass wasting of slopes. The remoteness and limited access adds to hazard concerns since it hampers communication during times of hazardous conditions and for rescue operations.

Tsunami - Lowlying areas along Hā'ena and the Nā Pali Coast were inundated by the tsunamis of 1946, 1957, 1960, and 1964, (Table 3). The susceptibility of the coastline to continued inundation by future tsunamis originating in the Aleutians and South America is inevitable due to the northern exposure of the lowland at Hā'ena to the sea. The Na Pali coastline from Polihale to Hanakāpī'ai Valley is not subject to inundation except for Miloli'i and Kalalau where inundation limits are 300 feet inland (U. S. Dept. of the Army and State of Hawaii, 1973, 4).

Reduction of the extent of inundation occurs with any roughness in the surface being inundated. Natural groves of trees have been known to be effective in this respect. Protection of improvements against tsunamis is best accomplished by not constructing improvements in the potential inundation zone. Buildings, if constructed in this zone, may be constructed to allow the force of the waves to pass through without having maximum effect, or to withstand the force of the waves (Moberly, 1963, 155).

A tsunami warning system for this remote area is needed. In addition, education of the visitors to the threat of this event should be undertaken such that evacuation to designated safety zones occurs without mishap.

Streams - Streamflow records for stations within Kalalau, Hanakoa, and Hanakāpī'ai Valleys indicate the maximum runoff for a 20+ year period to be about 1,600 cubic feet per second/square mile (cfs/sq. mi.). Kalalau had a maximum runoff of about 650 cfs/sq. mi. Compared with other flood-prone areas on the island, runoff of this volume here can cause considerable flooding of lowlying areas. (U. S. Dept. of the Army and State of Hawaii, 1973, 6).

The areas between Wainiha and Kē'ē Beach are not subject to severe inundation from stream runoff. Ponding does occur in lowlying swamp areas adjacent to the highway (U. S. Dept. of the Army and State of Hawaii, 1973, 6).

Storms - Winter swells originating further north in the Aleutian Islands commonly cause severe damage to property on the north coasts of the Hawaiian Islands.

Storms, which increase the sea activity by producing storm surges, may also lead to damage from wind, stream flooding, run-off, and landslides. According to Moberly (1963, 156), most of the damaging wind storms and rainstorms in Hawai'i are local intensifications of the heavier kona storms caused by local topographic configurations. Storm run-off leads to flooding by streams in inland areas and along the shore.

In Hanakāpī'ai, stream flooding can occur where wave action built a sand bar which occasionally restricts the flow of one of the stream channels to the sea.

Hurricanes - Since 1950, four small hurricanes have passed through the islands. A full-scale hurricane would cause a greater likelihood of damage by windstorm, rain run-off, and flooding by storm surges. Two tornadoes on land and several watersprouts have been recorded (Moberly, 157).

Mass-wasting - Mass-wasting, the enmasse downslope movement of rock debris under the force of gravity, is a significant hazard in this region of very steep slopes especially along the Kalalau Trail, near waterfalls and ridges. The rapid soil movements, such as landslides, rock slides and rock falls are the most destructive kinds of mass-wasting in Hawai'i. The talus slopes along the bases of the pali indicate the frequency of these rock slides. At the foot of higher sea cliffs, such as the Nā Pali Coast, there is a constant downfall of large and small fragments of weathered rock (Moberly, 1959).

Soil Avalanche - Soil avalanche is a rapid downward movement of mainly unconsolidated material. It is common on steep slopes with thick soil and vegetated cover during heavy rains. Most of these soil avalanches take place on valley walls where rainfall is high. In coastal areas where rainfall is lower, such slides are less common.

Goat activity on steep slopes can also trigger movement of rocks.

Earthquakes - Earthquakes on Kaua'i are rare. There are no indications that any of Kauai's faults, including a large one near the center of the Nā Pali Coast, have been active in the recent past (Figure 8). No serious earthquakes are expected (Moberly, 162).

Health - Very little information is available about health conditions or the incidence of illness along the Nā Pali Coast. Hepatitis is the greatest potential health hazard from drinking stream water without first boiling it or using purification

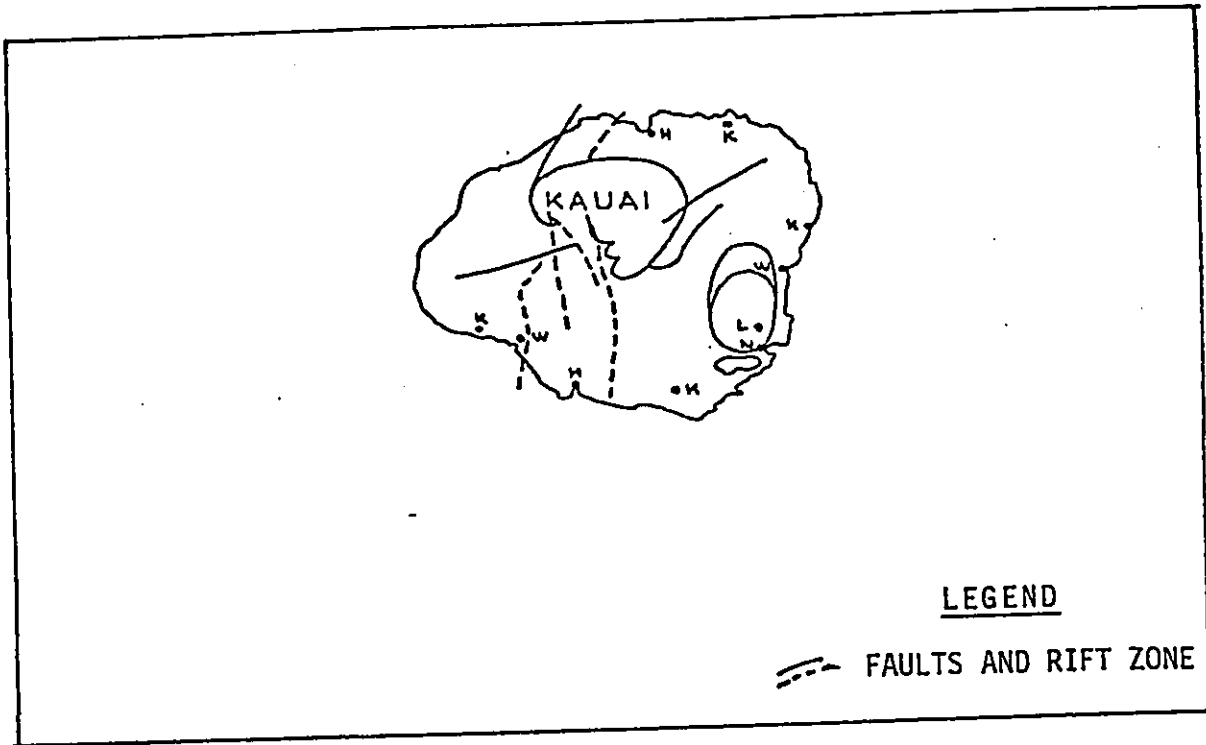


FIGURE 8
FAULT ZONES ON KAUA'I

Source: Moberly, Coastal Geology of Hawaii, 1963.

tablets (Matsuo and Inouye, Personal communication, 14 September 1977). In the five-month period from February to June 1977, a total of 64 cases of Hepatitis A was reported to the Department of Health. The outbreaks occurred in Taylor Camp, Valley House and Hanalei areas due to poor sanitation and hygiene in transient areas of Kapaa and northshore communes (Soares, Personal communication, 09 September 1977).

Warnings have been issued also against swimming in streams or drinking water from Kaua'i streams without first boiling or purifying it with tablets. These warnings follow an increase in the incidence of Leptospirosis on the island from 0 in 1970 through 1972 to 6 in 1976 and 1 from March through August 1977. (Tenbruggencate, Honolulu Advertiser, 1976, A-10). Leptospirosis occurs among swimmers exposed to water, moist soil, or vegetation contaminated by urine of domestic or wild animals. Its symptoms include: fever, headache, chills, vomiting, muscular aches, and other ailments. Rats and other rodents are frequently infected. Tests are presently being conducted on wild goats and toads to determine if they are carriers of this disease. Preventive measures include: a) identification of potentially contaminated waters, b) education of the public on the modes of transmission and unsafe, contaminated waters, c) rodent control in areas of human habitation, and d) segregation of domestic animals, and the prevention of contamination of living, and recreation areas contaminated by urine of infected animals. The implicated streams are Wainiha Stream, Hanalei River, Lawai Stream, and Valley House Stream (Department of Health, Kauai, n.d.).

Water samples taken by the Department of Health on 09 May 1977 showed the following results:

Kalalau Stream near cave mouth -
Coliform MPN: 35,000 per 100 ml.
Fecal Coliform MPN: 130 per 100 ml.

Kalalau Lookout Stream -
Coliform MPN: 7,900 per 100 ml.
Fecal Coliform MPN: 220 per 100 ml.

Kalalau Stream near Cave Fall -
Coliform MPN: 3,300 per 100 ml.
Fecal Coliform MPN: 49 per 100 ml.

Miloli'i -
Coliform MPN: 2,300 per 100 ml.
Fecal Coliform MPN: 33 per 100 ml.

Kalalau Beach -
Coliform MPN: 2 per 100 ml.
Fecal Coliform MPN: +2 per 100 ml.

Miloli'i Beach
Coliform MPN: +2 per 100 ml.
Fecla Coliform MPN: +2 per 100 ml.

Kalalau Valley has the highest coliform count of the 5 tested sites.