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CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

February 26, 1997

Mr. Gary Gill, Director
Office of Environmental Quality Control
235 South Beretania Street, Room 702
Honolulu, HI 96813

Dear Mr. Gill,

Subject: Finding of No Significant Impact for Kanepu`u Preserve Natural Area Partnership, District of Lahaina, County of Maui, Hawai`i; TMK: 4-9-02-01.

The Department of Land and Natural Resources, Division of Forestry and Wildlife has reviewed and responded to comments received during the 30-day public comment period. The agency has determined that this project will not have significant environmental effect and has issued a Finding of No Significant Impact. Please publish this notice in the March 8, 1997 Environmental Notice.

We have enclosed a completed Publication Form and four copies of the final Environmental Assessment.

Please contact Betsy Gagné at 587-0063 if you have any questions.

Sincerely,

Michael G. Buck, Administrator
Division of Forestry and Wildlife

encl

1997-03-08- LA-FEA- Kanepuu Preserve
Natural Area Partnership

FINAL ENVIRONMENTAL ASSESSMENT FOR KĀNEPU'U PRESERVE NATURAL AREA PARTNERSHIP

This document prepared pursuant to Chapter 343, HRS

Prepared by
The Nature Conservancy

February 1997

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I. SUMMARY

CHAPTER 343, HAWAI'I REVISED STATUTES (HRS)
ENVIRONMENTAL ASSESSMENT

Project Name

Kānepu'u Preserve Natural Area Partnership

Proposing Agency / Applicant

State of Hawai'i
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street
Honolulu, Hawai'i 96813

The Nature Conservancy
1116 Smith Street, Suite 201
Honolulu, Hawai'i 96817

Approving Agency

State of Hawai'i
Department of Land and Natural Resources
Division of Forestry and Wildlife

Project Location

Kānepu'u Preserve, 590 acres on the Island of Lāna'i, in the District of Lahaina, County of Maui, State of Hawai'i

Tax Map Key	Acreage
4-9-02-01	590.377

Agencies Consulted During EA Preparation

(The individuals and agencies listed were provided with copies of the preserve long range management plan, and given 3–4 weeks to respond. All written comments received are included in Appendix 1.)

Federal

US Department of Agriculture/ Animal Damage Control
US Department of Agriculture/ Forest Service
US Department of Agriculture/ Natural Resources Conservation Service
US Department of the Army / Corps of Engineers
US Department of the Interior/ Fish & Wildlife Service
US Department of the Interior/ National Biological Service
US Environmental Protection Agency

State

Department of Agriculture
Department of Hawaiian Home Lands
DLNR/ Aquatic Resources Division—Maui District
DLNR/ Office of Conservation and Environmental Affairs
DLNR/ Division of Conservation and Resources Enforcement
DLNR/ Division of Forestry & Wildlife—Maui District
DLNR/ Division of Land Management—Maui District
DLNR/ State Historic Preservation Division
Kaho'olawe Island Commission
Natural Area Reserves System Commission
Office of Planning
Representative David Morihara
Representative Joseph Souki
Representative Michael White
Senator Roz Baker
Senator Avery Chumbley
Senator Joe Tanaka
University of Hawai'i, Cooperative Extension Service
University of Hawai'i, Environmental Center
University of Hawai'i, Secretariat for Conservation Biology

County

County Council
Department of Economic Development
Department of Public Works
Department of Water Supply
Mayor
Planning Department

Private

Castle & Cooke Properties, Inc.
Center for Plant Conservation Hawaiian Flora
Conservation Council for Hawai'i
Mrs. Adolph Desha
Hawai'i Audubon Society
Hawaiian Botanical Society
Hui Malama Pono o Lāna'i
Lāna'i Community Association
Lanai Company
Lāna'i Hunter Advisory Group
Lānaians for Sensible Growth
Native Hawaiian Advisory Council
Native Hawaiian Legal Corporation
Native Hawaiian Plant Society
Sierra Club Legal Defense Fund
The Lodge at Koele
The Outdoor Circle
The Wildlife Society

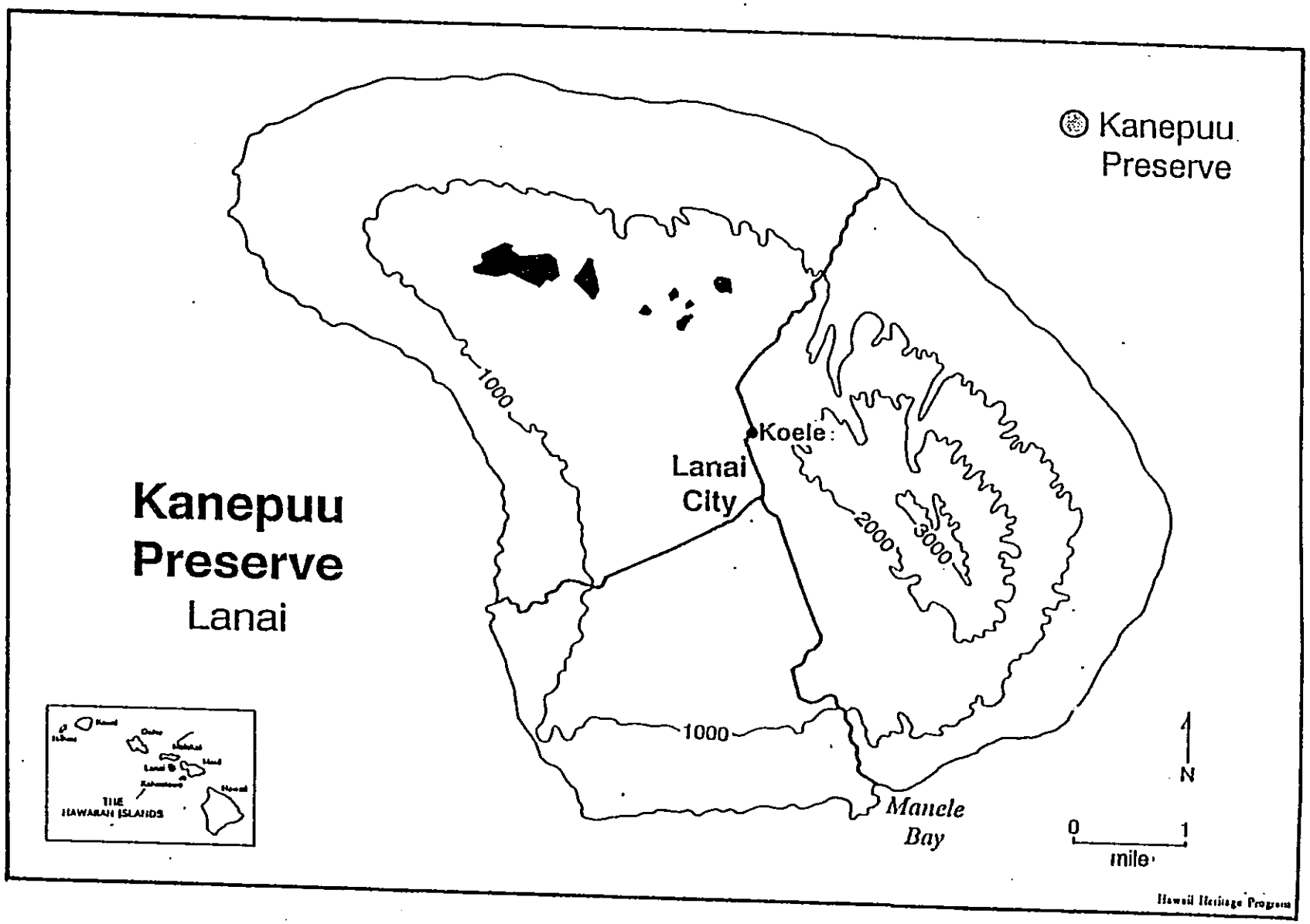
II. PROJECT DESCRIPTION

The formation of Kānepu'u Preserve was announced in January 1989; it was officially established in November 1991 when Dole Foods, Inc. finalized a perpetual conservation easement with The Nature Conservancy (Figure 1). The preserve was created to protect and enhance the olopua/lama (*Nestegis/Diospyros*) dryland forest that once covered large portions of the lowlands on Maui, Moloka'i, Kaho'olawe, and Lāna'i. Today, Kānepu'u contains the last major remnant of this rare dryland forest community.

Major threats to the preserve's native vegetation are introduced game animals (axis deer [*Axis axis*] and mouflon sheep [*Ovis musimon*]), cattle (*Bos taurus*), rapid soil erosion, wildfire, and a number of invasive alien (non-native) plants. Much of this area was protected from 1911 until 1935 by fencing and other efforts carried out by George Munro, then the ranch manager for the area. These fences were removed by subsequent ranchers. In the 1970s, 1980s, and 1990s, dedicated volunteers and the group *Hui Malama Pono o Lāna'i* built four small fenced exclosures that helped protect patches of native forest and associated rare plants. Without these efforts, the last remnants of this rare Hawaiian forest type would probably have been destroyed. In 1992, The Nature Conservancy completed construction of a 6'3" tall deer fence around each of the seven patches of forest to prevent further damage by grazing animals.

The state's Natural Area Partnership Program (NAPP) provides matching funds ($2 state to $1 private) to managers of qualified private lands. Kānepu'u was approved for NAPP funding in 1992; the contract is scheduled to be renewed in 1997. The renewal procedure includes the

Figure 1


Kanepuu
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THE
HAWAIIAN ISLANDS
Hawaii Heritage Program

preparation of a new 6-year management plan, and public review via the Environmental Assessment process. Previous management work was conducted under a Conservation District Use Permit (number SH-2028A). Approximately $787,000 in state funds, distributed over 6 years, will be needed to implement the work outlined in this document.

Summary Description of the Affected Environment

Location

The preserve, located northwest of Lāna'i City, is comprised of seven disjunct sections ranging from 13 to 368 acres in size, and totals 590 acres (Figure 2). The elevation in this area is approximately 1,700 feet. The climate at Kānepu'u is harsh: rainfall averages only 21 inches per year, and tradewinds are accelerated by the upwind islands of Moloka'i and Maui. These strong winds exacerbate vegetation loss and soil erosion in and around Kānepu'u; in some places, up to 6 feet of soil has been lost. These degraded areas usually have little vegetation and are, therefore, even more susceptible to increased erosion.

Natural Communities

Kānepu'u is dominated by two plant communities: the native closed-canopy olopua/lama dryland forest, and an alien shrubland. Some sections of the preserve are bordered by a windbreak of non-native trees including swamp mahogany (*Eucalyptus robusta*), ironwood (*Casuarina* sp.), and Cook Island pine (*Araucaria* sp.). Areas of bare soil occur throughout the preserve.

The native forest canopy is dominated by 80% olopua (*Nestegis sandwicensis*) and 10% lama (*Diospyros sandwicensis*). The canopy also contains non-native Christmas berry (*Schinus terebinthifolius*), and up to 12 native species including 'ohe makai (*Reynoldsia sandwicensis*), 'ahakea (*Bobea sandwicensis*), 'āla'a (*Pouteria sandwicensis*), and 'aiea (*Nothocestrum latifolium*). The understory has been damaged as a result of historical grazing, and contains few remaining native species. Common non-native understory species include lantana (*Lantana camara*), scarlet sage (*Salvia coccinea*), and several grasses including Dallis grass (*Paspalum dilatatum*) and molasses grass (*Melinis minutiflora*). (Figure 3 shows the current natural communities of the Kānepu'u unit. Figures for the other six units of Kānepu'u Preserve are available but are not included with this document to save space.)

Kānepu'u does not contain streams or other aquatic natural communities.

Figure 2

Kanepuu Preserve

Units

KANEPUU

KAHUE

PAOMAI 2

PAOMAI 1

MAHANA

UPPER PAOMAI

AHAKEA

L A H A I N A

Lanai

Lanai City

Koele

0 0.5 mile

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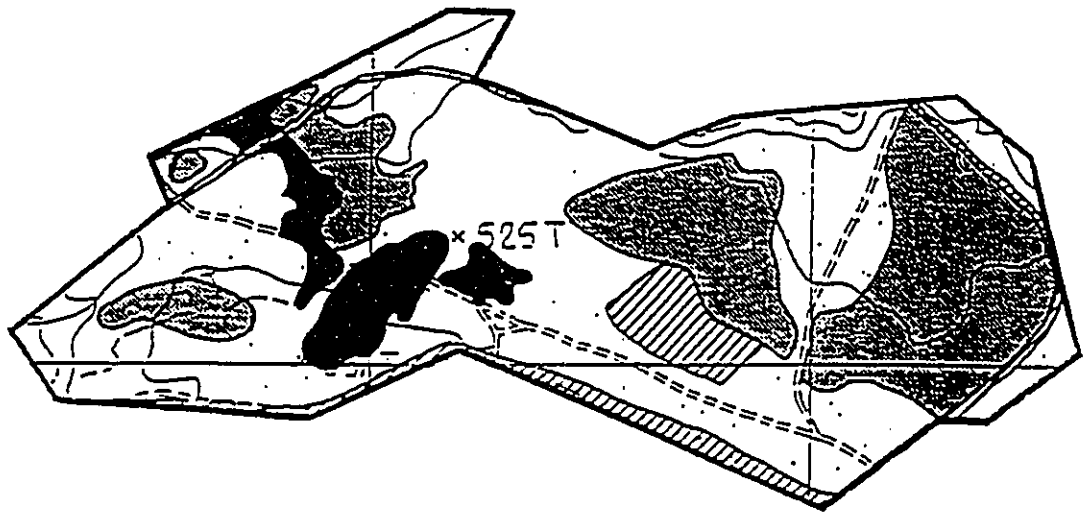

Figure 3
Kanepuu Unit
Kanepuu Preserve

0 500 meters
0 1000 feet
N

- Clopua/Lama Dryland Forest (Including degraded sections)
- Alien-dominated Shrubland (Schinus, Lantana & Mixed grasses)
- Windbreak (Eucalyptus, Casuarina, Araucaria)
- Bare Soil

Native Flora

Ten rare plants have been reported in Kānepu'u; six of these are federally listed as endangered. However, two of these listed species, and another with no federal status, are known only from historical records and have not been seen at Kānepu'u since 1975 (Appendix 2). The four endangered plants currently found in the preserve are: the fragrantly flowered *Gardenia brighamii*, sandalwood, or 'iliahi (*Santalum freycinetianum* var. *lanaiense*), the vining *Bonamia menziesii*, and the ma'o hau hele (*Hibiscus brackenridgei* ssp. *brackenridgei*). The ma'o hau hele was planted in the preserve and may not have occurred there naturally.

Native Fauna

Vertebrates

Two native birds, the pueo (short-eared owl, *Asio flammeus sandwichensis*) and the kolea (Pacific golden-plover, *Pluvialis fulva*), frequent Kānepu'u. Eleven non-native birds, including introduced game birds, are also found in the preserve's forest and open areas.

Invertebrates

At least ten different land snail taxa were identified in a subfossil sample found in the Upper Paoma'i unit of the preserve. Currently, only the most common native snails still exist in Kānepu'u Preserve.

Kānepu'u's arthropod fauna was sampled in 1992. According to collection records, 153 different insect species (some unidentified) were found in the preserve. Nineteen spider taxa, 2 isopods, and 1 species of amphipod were also collected. Native taxa include a pyralid moth (genus *Scoparia*), mirids, drosophilids (fruit flies), yellow-faced bees (genus *Hylaeus*), and sphecid wasps.

Historical/Archaeological and Cultural Sites

During a limited site visit in September 1996, Dr. Boyd Dixon of the State Historic Preservation Division (SHP) did not observe any surface evidence of cultural remains or historic sites in Kahue or Kānepu'u units. According to SHP, the only known site in the vicinity of Kānepu'u Preserve is the 'ulu maika playing field described by Kenneth Emory in 1924. The site, located outside the preserve approximately 1 kilometer south of the current Kānepu'u unit fenceline, was not relocated during a statewide inventory in 1974, and is presumed to have been destroyed.

SHP has determined that, in general, the proposed activities will have no effect on significant historic sites.

Adjacent Natural Resources

The areas immediately adjacent to Kānepu'u Preserve are not particularly biologically significant. All seven management units are surrounded by sustained yield game management areas, or by cattle pasture. Grazing deer, sheep, and cattle have degraded most of the remaining native vegetation on these surrounding lands.

Sensitive Habitats

Much of Kānepu'u Preserve is regarded as sensitive. The intent of all proposed management activities is to provide long-term protection to the rare forest. Potential negative effects of management activities such as introduction of new weeds are recognized, and special precautions will be taken to minimize the risks.

General Description of the Action's Technical, Socio-economic and Environmental Characteristics

Technical

This project is long term, consisting of several different phases. The primary goal is to maintain and enhance native ecosystems and protect the habitat of rare plants in the designated area. In addition to the NAPP contract currently in place, the Conservancy has entered into a number of agreements to facilitate management at Kānepu'u Preserve. These are summarized below.

- In 1991, Dole Foods, Inc. granted a perpetual conservation easement to The Nature Conservancy. (This easement was later transferred to Castle and Cooke Inc., the current landowner.) The purpose of the easement is to preserve, protect, enhance, and restore the natural ecological, aesthetic, and scientific features of the preserve in perpetuity. The landowner retains the right to access the preserve to inspect the area, and to use the area within regulations set by the Conservancy. Uses permitted in the easement include hunting, hiking, and using horses and vehicles on existing roadways. Commercial use of the preserve by the Conservancy is allowed with written permission of the landowner. The establishment of any industrial use of the preserve is forbidden, as are growing of crops, exploration for minerals, removing vegetation (except as required for management purposes), and grazing or driving of horses, cattle, or other livestock (except as required for management purposes).

- Kānepu'u Preserve is covered under a state-wide Memorandum of Understanding between The Nature Conservancy and the state Department of Land and Natural Resources for wildfire suppression.

Management Considerations

This section describes specific management strategies that will be undertaken to maintain and enhance the native ecosystems and species of Kānepu'u Preserve. Management goals for 6 fiscal years are discussed (FY1998 – FY2003). (The Conservancy has adopted a July 1 – June 30 fiscal year.) The Nature Conservancy will be responsible for the completion of the management work. Our management strategies are shaped by the following considerations:

1. The lands surrounding the preserve are utilized for sustained-yield sport hunting of axis deer and mouflon sheep, and for domestic cattle grazing. The preserve area has been fenced to prevent these animals from further damaging the native vegetation. Preserve activities must be coordinated with surrounding activities for safety reasons and to ensure a good working relationship with preserve neighbors.

2. Of the preserve's seven units, Kahue unit has the highest diversity of rare plants, and is important for both restoration and interpretation. Kānepu'u unit has the largest patches of native forest, and is the most important for restoration; interpretation potential here is also great because of its location along a public road. 'Ahakea unit also has a high concentration of rare plants, but the patches of native forest are at either end of the unit, and the smaller patch in the southwest corner is quite degraded. The Paoma'i units contain nice patches of forest, but are quite small. The Mahana unit is separated from the rest of the preserve by the greatest distance, and is also biologically the lowest priority for management and restoration.

3. All management units are accessible by good-quality dirt roads. Four-wheel drive is needed during wet weather. Unit boundaries, fencelines, and firebreaks are mostly accessible to tractors or other equipment. Access to the preserve area is generally through abandoned pineapple field roads, which may be moved over time. The entire preserve is easily accessible on foot. Mapped corridors that link the seven preserve units (Figure 2) were established to satisfy county subdivision requirements, and do not represent road access between units.

4. The Lāna'i community and other members of the public were involved at Kānepu'u before it was a preserve of The Nature Conservancy. Interpretive and other public programs will continue to encourage their participation, and compatible public use will be developed within the Conservancy's primary goal to protect and restore native species.

5. Due to past deforestation and grazing animals, massive erosion by wind and rain is a major threat to the preserve. Non-native plant species may have to be utilized to control this erosion in some areas. Wherever possible, however, non-native plants will be replaced with appropriate native species.

6. Because of its accessibility and range of important research opportunities, Kānepu'u Preserve will be used, to the extent possible, as a focal point for dryland forest restoration studies in

Hawai'i. Knowledge derived from Kānepu'u studies will help protect other dryland areas with similar problems.

Management Units

As was described above, the preserve encompasses seven fenced patches of dryland forest. Each of these patches, ranging in size from 13 acres to 368 acres, is considered a *management unit*. All seven units are defined by placenames, and will be managed similarly as they share the same topography, natural communities, and threats. In this plan, reference is also made to *exclosures*; these are smaller fenced areas constructed in the 1970s, before the preserve was established. There are four such exclosures: two in Kānepu'u unit (Lapaiki exclosure and "Little" exclosure), one in Kahue unit, and one in 'Ahakea unit.

Management Goals

Goals are listed for each management program, followed by a brief description of the program accomplishments to date, and strategies for the 6-year period covered in this plan. A timeline is provided for each program.

Non-Native Species Control Programs

Ungulate Control

Program Goal: Remove all axis deer from preserve units and prevent them from returning; exclude mouflon sheep and cattle from preserve.

In September of 1992, 9 miles of 6'3" tall deer fence was completed, encircling each of the seven preserve units. Since fence construction, volunteer hunters have removed more than 340 deer; all units are now deer-free except Kānepu'u unit. These hunts, utilizing Lāna'i residents, continue to remove remaining deer from Kānepu'u unit. We work cooperatively with the state Division of Forestry and Wildlife and Division of Conservation and Resources Enforcement on all aspects of our ungulate control program. Mouflon sheep, which are increasing in number on Lāna'i, and cattle, which previously wandered into some the preserve units, are now fenced out of the preserve. There are no feral pigs or goats on the island of Lāna'i.

Over the past 4 years, we have noted the presence of native tree seedlings of many species; previously, seedlings had been eaten by deer. Moreover, mature trees, formerly stripped of leaves and branches to the height a deer can reach, are now resprouting from the base. Fence maintenance is critical to the continued exclusion of ungulates from the preserve.

Initially, erosion caused by heavy rains was the focus of fence maintenance efforts. A culvert was constructed in one area, and a ditch was dug to channel water away from the fenceline in another area. In FY1995 and FY1996, aprons were constructed to repair areas where fence posts lifted out of the ground causing the bottom wire to rise (in some cases, 1 to 2 feet) above the ground. Additionally, fence wire corrosion accelerated significantly in FY1996.
The last long-range plan for Kānepu'u Preserve included annual fence maintenance and replacement; however, for the initial years of that plan, very little replacement was needed. In this plan, we propose to replace wire around entire units at a time. We have learned that once the galvanizing on the current 12.5 gauge wire becomes noticeably corroded (rusted looking), the wire fails quickly (i.e. within about 6 months). Salt spray, carried 3 miles inland and up to Kānepu'u Preserve's 1,700-foot elevation, seems to be the largest corrosive factor. Professional fence builders and natural area managers surmise that the dry environs of Kānepu'u, exacerbated by the drought of the past few years, has allowed salt spray to stick to the wire rather than being washed clean by rains. Only where a tall shrub, tree, or fence post protects wire from the salt spray is corrosion minimal or non-existent. The corrosion appears slightly accelerated where the fence is downwind from an un-vegetated area; this is probably due to soil particles constantly battering the fence. While we considered revegetation as part of the fence protection program, it appears that only tall vegetation will protect the fence, and this poses other problems to fence maintenance.

This plan outlines a fence replacement strategy to replace wire around a number of units during the first 3 years. This will complete fence replacement begun in FY1996. Additionally, results of a fence materials test to be completed in FY2000 will determine the most durable materials. Costs for the materials and installation will be assessed as well, and the most cost-effective materials will be selected for future fence replacement.

Year 1 (FY1998)
- Replace wire around southern half of Kānepu'u unit, and Paoma'i 1 unit.
- Repair wire where damaged in all units; reroute water to prevent erosion.
- Remove deer from Kānepu'u unit using volunteer hunters.

Year 2 (FY1999)
- Replace wire around Paoma'i 2 and 'Ahakea units.
- Repair wire where damaged in all units; reroute water to prevent erosion.
- Evaluate materials performance in fence materials trial.
- Complete removal of deer from Kānepu'u unit using volunteer hunting.

Year 3 (FY2000)
- Replace wire around Upper Paoma'i and Mahana.
- Repair wire where damaged in all units; reroute water to prevent erosion.
- Evaluate materials performance in fence materials trial; determine best future material.
- Maintain zero ungulate levels.

Year 4 (FY2001)
- Replace fencing around Kahue unit and the north side of Kānepu'u unit using best material determined in materials trial.
- Repair damage to wire; redirect water and fill in erosion that may undermine the fence.
- Maintain zero ungulate levels.

Year 5 (FY2002)
- Replace fencing around southern half of Kānepu'u unit, and around Paoma'i 1 unit using best material determined in materials trial.
- Repair wire where damaged in all units; reroute water to prevent erosion.
- Maintain zero ungulate levels.

Year 6 (FY2003)
- Replace fencing around Paoma'i 2 and 'Ahakea units using best materials determined in materials trial.
- Repair wire where damaged in all units; reroute water to prevent erosion.
- Maintain zero ungulate levels.

Weed Control

Program Goal: Prevent the further displacement of native vegetation by non-native plants and, where possible, reduce and eradicate weed populations.

With the removal of ungulates from the majority of the preserve, weed control has become the most labor-intensive program at Kānepu'u. A number of non-native plants are well established in the preserve; we have narrowed our focus to controlling habitat-modifying weeds (see Table 1). Our strategy has been, and continues to be, removal of canopy-dominant species in the most intact native forest areas, removal of incipient weeds preserve-wide, and lastly, removal of additional habitat-modifying weeds from wider areas in the preserve. Weed control is accomplished manually, with limited use of herbicides (see following page); heavy equipment is not used. Starting in FY2000, gaps created in the native forest as a result of weed removal will be filled through planting of native species.

Another aspect of our weed control program is prevention. Education about potentially harmful weed introductions can have a large impact on Lāna'i because of its small resident population, lack of commercial nurseries, and limited visitor accommodations. This work will begin in FY1997 with information provided to the island's largest nursery and landscaper, Lanai Company, and will continue under this long-range plan with additional programs such as outreach to hunters, and assisting with removal of incipient populations of potentially harmful weeds found outside the preserve.

In the past 4 years, we've concentrated on the removal of canopy-dominating weeds, primarily *Schinus terebinthifolius* (Christmas berry), from the most intact forest patches. Monitoring and

TABLE 1. Habitat-modifying weed species in Kānepu'u Preserve.

Scientific Name	Common Name
Acacia confusa	Formosan koa
Casuarina sp.	Ironwood
Grevillea robusta	Silk oak
Lantana camara	Lantana
Leucaena leucocephala	Koa haole
Melinis minutiflora	Molasses grass
Panicum maximum	Guinea grass
Passiflora suberosa	Huehue haole
Psidium cattleianum	Strawberry guava
Psidium guajava	Guava
Schinus terebinthifolius	Christmas berry

re-treating re-growth remains a growing part of the weed control effort. *Passiflora suberosa* (huehue haole, or corky passion vine) was not documented in the preserve until FY1995; however, we know it is not a new pest because not only it is widespread, but some of the resprouting vines are quite large. It was likely suppressed by deer. This vine is a major concern because it has become a major pest in other dry forests in Hawai'i.

Weed control strategies will be outlined in more detail in the *Weed Control Plan* staff develop for the preserve in FY1997. The plan will be updated as necessary to reflect changes in our understanding of the threats posed by specific weeds, and more efficient techniques for removal. We expect to employ a combination of manual and chemical control methods, using non-restricted use herbicides. Those being considered for use include Garlon 3A, Garlon 4, Roundup, EZ Ject glyphosate capsules, and one or more grass-specific herbicides that we have not yet identified. Herbicides will generally be applied using an EZ Ject lance (in the case of glyphosate capsules), or solutions will be painted or dripped directly on cut stumps or in frill cuts. Localized spraying of grasses with a backpack sprayer may be employed on non-windy days.

Year 1 (FY1998)

- Complete removal of Christmas berry from intact native forest patches in Kahue, 'Ahakea, Paoma'i 1, Paoma'i 2, and Upper Paoma'i units.
- Conduct follow-up treatment of Christmas berry where re-sprouting in Lapaiki and Kahue exclosures, and along interpretive trail.
- Remove *Passiflora suberosa* as found in all units.
- Conduct weed control as needed for restoration work in Kahue unit.
- Develop flyer about weed prevention for distribution to hunters.
- Assist with removal of potentially harmful incipient weeds found outside the preserve.

Year 2 (FY1999)

- Remove Christmas berry and other canopy-dominating alien plants from the most intact native forest patches in the Kānepu'u unit.

- Conduct follow-up treatment of previously treated weeds.
- Conduct weed control in Kānepu'u unit as outlined in revised Restoration Plan.
- Assist with removal of potentially harmful incipient weeds found outside the preserve.

Years 3 & 4 (FY2000 & 2001)
- Continue removal of canopy-dominating alien plants in Kānepu'u unit.
- Plant native plants in gaps created within native forest by weed control.
- Conduct follow-up treatment of previously treated weeds.
- Conduct weed control in 'Ahakea unit as outlined in revised Restoration Plan.
- Expand weed control into adjacent areas to reduce dispersal sources.
- Assist with removal of potentially harmful incipient weeds found outside the preserve.

Years 5 & 6 (FY2002 & 2003)
- Continue expansion of weed control into adjacent areas to reduce dispersal sources.
- Conduct follow-up treatment of previously treated weeds.
- Conduct weed control in Paoma'i units as outlined in revised Restoration Plan.
- Expand planting of native species in conjunction with weed control.
- Assist with removal of potentially harmful incipient weeds found outside the preserve.

Small Mammal Control

Program Goal: Prevent small mammals from damaging rare native species, and limit their impact on the preserve's overall native biota.

Our current small mammal control program focuses on controlling rats and mice with diphacinone bait blocks in bait boxes; if we observe other small mammals (feral rabbits, feral cats) posing a threat to the preserve, we will expand this program to deal with those threats as warranted. The mongoose is not currently established on Lāna'i.

Diphacinone is registered for use in natural areas in Hawaii under a Section 24c registration (also known as a special local use registration). All diphacinone use at Kānepu'u is in accordance with the special local use registration. Bait is deployed in Protecta brand tamper-proof boxes. The state Department of Agriculture is tracking diphacinone use in Hawai'i, and requires annual notification of use (our current notification exists through October 1997). Bait is limited to 16 ounces per station at any one time. All areas baited are posted in accordance with requirements. If approved for use in Hawaiian natural areas, we may also deploy other types of rodenticides that are shown to be safe and effective.

Rats and mice are known to damage native ecosystems by consuming or damaging flowers, fruits, and new growth of plants, and by reducing native invertebrate populations. Our small mammal control program is designed to reduce the impact of rats and mice on native plant regeneration; however, we do not have a suitable technique for directly monitoring this impact. We currently only monitor the amount of bait taken. A rat impact assessment is included on the list of research needs for Kānepu'u Preserve (Appendix 3).

TABLE 2. Locations of rodent bait stations in Kānepu'u Preserve.

Location	No. of Stations	Frequency	Purpose
Kānepu'u unit			
Lapaiki	4	year-round	to protect rare plant cluster
Little Kānepu'u	4	year-round	to protect rare plant cluster
Kahue unit			
Kahue exclosure, extending outside	8	year-round	to protect rare plant cluster
Reynoldsia	4	seasonal, to coincide with fruiting	
Nothocestrum	4	1-year trial; may continue for all 6 years	
Paoma'i units			
Reynoldsia patches	~10	seasonal, to coincide with fruiting	
Upper Paoma'i "intact forest patch"	4	year-round	
'Ahakea unit			
Exclosure	4	year-round	to protect rare plant cluster
Gardenia	4	1-year trial until we determine this is a fruiting tree; may continue for all 6 years	

An assessment of the rat population of Kānepu'u was conducted in January 1995. The results of this assessment included a recommendation to use bait stations in 50-meter grids around rare plant populations. U.S. Fish and Wildlife recovery plans for both *Gardenia brighamii* and *Santalum freycinetianum* var. *lanaiense* state that rodent control efforts should be implemented for these species at Kānepu'u. Both of these species usually have fruit on them year-round. Other rare plant taxa, such as *Bonamia menziesii* and *Reynoldsia sandwicensis*, would probably also benefit from rodent control during fruiting stages. The stations established in FY1996 and FY1997 are distributed to protect these rare plants (Table 2).

In FY1997, we will increase the number of bait stations from 28 to 46. We will also determine the optimal re-baiting interval in FY1997 (the minimum interval is 1 month).

Year 1 (FY1998)
- Maintain existing stations at interval determined in FY1997.
- Track take and report.
- Re-assess need to continue baiting around specific rare plants: *Gardenia* in 'Ahakea unit, and *Nothocestrum* in Kahue unit.

Year 2 (FY1999)
- Maintain and track established bait stations

Years 3 & 4 (FY2000 & 2001)
- Continue rodent control as warranted by previous work.
- Re-evaluate rodent control needs.

Years 5 & 6 (FY2002 & 2003)
- Continue rodent control to protect seeds and seedlings of native plants.

Fire Control

Program Goal: Prevent all wildfires in the preserve.

Wildfire is a major threat that has diminished the extent of native vegetation in the preserve in the past. Vehicle traffic along roads passing through or near the preserve is the primary source of ignition for wildfire. Nevertheless, the Conservancy is required to accommodate public access through the preserve along these or suitable alternate roads. We will maintain the swath of cleared vegetation along the fenceline as a fuel break for fire prevention. All full-time staff will participate in fire training offered by state or federal partner agencies.

Staff have prepared a fire management plan for Kānepu'u Preserve, and will update the plan annually to reflect advances in our fire pre-suppression activities. We work with the Division of Forestry and Wildlife (DOFAW) under a Memorandum of Understanding for fire suppression at Kānepu'u Preserve, and meet with DOFAW and county fire personnel on Lāna'i annually to discuss our fire management plan and address fire-related issues.

Years 1 – 3 (FY1998 – FY2000)
- Maintain fuel breaks.
- Meet with County and DOFAW fire staff to discuss fire preparedness.

Year 4 (FY2001)
- Maintain fuel breaks; grade along fence as needed to accommodate mower.
- Update fire and safety tools.
- Meet with County and DOFAW fire staff to discuss fire preparedness.

Years 5 & 6 (FY2002 & 2003)

- Maintain fuel breaks.
- Meet with County and DOFAW fire staff to discuss fire preparedness.

Restoration, Research and Monitoring

Program Goal: Create a naturally regenerating native dryland forest, and expand the current range of the forest through restoration activities. Document the successes and failures of our restoration work for application to other dryland areas of Hawai'i. Track the preserve's biological and physical resources, and evaluate changes in these resources over time.

Threat control programs at Kānepu'u Preserve will slow the loss of native forest, but active vegetation manipulation is needed to ensure expansion and eventual *self-perpetuation of the* forest and its associated rare plants. Because of its accessibility and broad range of restoration problems, we envision Kānepu'u becoming an important study site for testing and refining restoration techniques, and communicating these to a broader audience. Restoration of tropical dryland systems is a relatively new area for Hawai'i's resource managers, and we will collaborate wherever possible to teach, and learn from, other agencies and individuals.

To date, we have initiated both passive (removal of competing weeds and measuring natural regeneration) and active (planting native species) trials. These trials were among those outlined in a restoration plan that was drafted in FY1994 (the plan will be updated in FY1997). Results of trials to date are reported in previous years' annual reports for the preserve. We have collected thousands of seeds, and worked with cooperative nurseries on Lāna'i, O'ahu, and Kaua'i to propagate only 100 or so plants. Production of seedlings has been stymied by a variety of factors, including: an extremely low germination rate for olopua using traditional techniques, inviable seed embryos, contamination of seeds (making embryo explant in Lyon Arboretum's Micropropagation Facility impossible), rat predation of seeds and seedlings in the nursery, and pest plant and insect contamination in the nursery. In FY1996-97 we constructed a nursery on Lāna'i to enhance propagation efforts, and to minimize contamination of seedling containers with weed and insect pests. In FY1997, we will fund propagation trials to determine the most efficient, traditional germination techniques. We will continue to work with cooperating nurseries on other islands to ensure an adequate supply of seedlings for ongoing restoration trials and plantings.

Another effort covered under this program is rare plant outplanting. Our immediate priority is to augment Kānepu'u's existing populations beginning with the rarest species. Work on propagating *Gardenia brighamii* and *Santalum freycinetianum* var. *lanaiense* will begin in FY1997; these efforts are expected to continue in FY1998.

Because mongoose have not been introduced to Lāna'i, the island is a good candidate location for reintroduction of native ground nesting birds. In FY96 we conducted a site assessment, with state Wildlife staff, for reintroduction of the Hawaiian goose (nēnē, *Branta sandvicensis*). Habitat

in the preserve was not deemed suitable for reintroduction of nēnē, though they may be reintroduced to another area of the island by the state and landowner. We will do a similar habitat assessment for reintroduction of the dark-rumped petrel ('ua'u, *Pterodroma phaeopygia sandwichensis*) in FY2001.

Research is an integral part of our restoration program, as it is only through research that we can make gains in our understanding of the dynamics that shape the preserve's forests and affect its rare plants. Attached to this plan is a Research Needs list that details questions we need answered in order to better manage the preserve (Appendix 3). This list will be promoted through the University of Hawai'i's Secretariat for Conservation Biology, and restoration forums such as the journal of the Society for Ecological Restoration (*Restoration Ecology*), and electronically through world-wide web sites related to restoration topics. Research topics to be initiated in a given year will rely on securing an interested researcher with funding who is committed to one of the topics (or a closely related topic) on our Research Needs list. We will offer a modest stipend to support and encourage research at Kānepu'u Preserve.

Long-range monitoring of preserve vegetation was initiated in FY1993. The monitoring methods were designed to gather data comparable to vegetation measures (taken in Kānepu'u unit) reported on in a 1976 article in the Hawaiian Botanical Society newsletter by Spence and Montgomery. These methods will be refined in FY1997 to ensure consistency in how data are gathered, and will be repeated every 10 years (as a result, this task is not included in this plan). In FY1998, we'll have the Hawai'i Natural Heritage Program undertake vegetation mapping using aerial photos and ground truthing using global positioning system (GPS) equipment. These vegetation maps will enable us to better track expansion of native forest over the long-term. Funds are budgeted in FY1999 for a GPS instrument that will be shared among the Conservancy's stewardship staff to continue mapping additional sites (such as rare plant locations, restoration sites), and to monitor changes in vegetation over time.

Restoration

Year 1 (FY1998)

- Guided by revised restoration plan, continue collecting seeds; propagate at the Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.
- Expand restoration work in Kahue unit (including planting, maintenance, monitoring).
- Maintain established restoration sites and collect data annually.
- Identify/prepare sites appropriate for rare plant outplanting.
- Prepare vegetation maps for preserve showing forest, shrublands, and bare dirt using GPS and downloading information into a Geographic Information System.

Year 2 (FY1999)

- Guided by revised restoration plan, continue collecting seeds; propagate at The Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.

- Continue restoration trials, evaluate results, and refine methodology.
- Expand restoration efforts in Kānepu'u unit (including planting, maintenance, monitoring).
- Maintain existing plantings in Kānepu'u and Kahue units.
- Develop water source at 'Ahakea unit.
- Increase rare plant numbers through outplanting.

Years 3 (FY2000)
- Guided by revised restoration plan, continue collecting seeds; propagate at The Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.
- Focus restoration efforts on 'Ahakea unit (including planting, maintenance, monitoring).
- Maintain existing plantings in Kānepu'u and Kahue units.
- Increase rare plant numbers through outplanting.

Year 4 (FY2001)
- Guided by revised restoration plan, continue collecting seeds; propagate at The Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.
- Maintain existing plantings in Kānepu'u, Kahue, and 'Ahakea units.
- Expand and diversify existing plantings in Kānepu'u, Kahue, and 'Ahakea units.
- Develop water source at Paoma'i units.
- Explore habitat needs and feasibility of reintroducing 'ua'u to Kānepu'u Preserve.
- Increase rare plant numbers through outplanting.

Year 5 (FY2002)
- Guided by revised restoration plan, continue collecting seeds; propagate at The Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.
- Focus restoration efforts on Paoma'i units.
- Maintain existing plantings in Kānepu'u, Kahue, and 'Ahakea units.
- Revise and update restoration plan.
- Evaluate work to date, document findings, report to larger group.
- If feasibility assessment to reintroduce 'ua'u is positive, determine tasks and timeline for reintroduction.
- Monitor outplanted rare plants.

Year 6 (FY2003)
- Guided by revised restoration plan, continue collecting seeds; propagate at The Conservancy's nursery, work with cooperative nurseries to propagate off-site, and implement appropriate monitoring of restoration areas.
- Maintain existing plantings in Kānepu'u, Kahue, 'Ahakea, and Paoma'i units.
- Monitor outplanted rare plants.

Research and Resource Monitoring

Years 1 – 6 (FY1998 – 2003)

- Promote Research Needs List through restoration societies/forums, and universities.
- Work with researchers to initiate or continue research at Kānepu'u Preserve; provide logistical assistance to researchers.
- Establish annual rare plant monitoring for all individuals of *Santalum freycinetianum* var. *lanaiense*, *Gardenia brighamii*, *Bonamia menziesii*, *Bobea sandwicensis*, *Nothocestrum latifolium*, *Nesoluma polynesicum*, and *Xylosma hawaiiense*.
- In Kānepu'u unit, document vegetation changes likely to have resulted from deer removal (beginning in FY1999).

Interpretation and Volunteers

Program Goal: To foster community awareness of Hawai'i's natural resource and restoration issues, especially those unique to Kānepu'u Preserve, and to attain preserve management goals with the assistance of volunteers.

Our interpretive program was developed over the past 4 years with guidance from members of *Hui Malama Pono o Lāna'i*, a group active in protection of Lāna'i's resources, and staff of Lanai Company. The current program includes a self-guided interpretive trail in the Kānepu'u unit, and a trail in the Kahue unit open only to visitors accompanied by staff or a trained hike leader (docent). We currently have five active docents. Since the docent training was completed in FY1994, these volunteers have led an average of eight hikes per year. The guided hikes were arranged for both small and large groups. The largest group that annually visits the preserve is the entire student body of Lāna'i High and Elementary School, some 300 children plus approximately 70 parent and teacher chaperones. While we believe guided visits are the best way to share the preserve's story, a public road traverses the Kānepu'u unit, so people must travel through the preserve going to points northwest. This provides an opportunity to expose more people to the preserve.

We will establish a short, 750-meter self-guided trail in the Kānepu'u unit in FY1997 to allow for unguided visitation to the preserve along the main (unpaved) Polihua Road. The trail will make a quick visit possible, and will improve the community's understanding of the preserve's resources. The brief trail signs were designed to match the existing interpretive signs on the island at the request of Lanai Company and *Hui Malama Pono o Lāna'i* to ensure a feeling of continuity with other important island sites. In discussions about the self-guided trail with the *Hui*, concerns were raised about abuse of the trail and preserve resources through unguided use (particularly the threat of taking native trees to use in woodworking). We agreed to watch for impacts on the trail and the surrounding area (mostly lantana-dominated, a deterrent to wandering off the trail). If we see such abuse, we will take measures to prevent it in the future, to the point of even removing the signs and halting use of the trail.

Because this island has a small population (there are fewer than 3,000 residents), Lāna'i poses a unique opportunity to educate the majority of residents to issues related to the conservation of Hawai'i's native natural resources. Our desire is to engage the Lāna'i community in natural resources protection in ways beyond the simple labor and education programs we've conducted in the past 5 years. We will scope and implement this new phase to our community outreach program within the years covered by this long-range plan.

Volunteers kept the last remnants of forest at Kānepu'u from being lost over the past several decades, and they will continue to be a key component of the preserve's programs. *Hui Malama Pono o Lāna'i* is the primary group on Lāna'i involved with Kānepu'u and preservation of the island's cultural, biological, and historical sites. We will continue to involve members of the *Hui*, and a variety of school and community groups and individuals, in undertaking this long-range management plan. We have established a camp site, and maintain necessary camping equipment, for volunteer groups to use in the Kānepu'u unit.

In the previous long-range plan, the task of developing a demonstration garden was included. Our original idea was to establish a display garden that would showcase many of the spectacular and rare dryland plants, and to illustrate the restoration work we've undertaken. The idea of a formal garden has been dropped, as it increases our work in maintaining restoration sites that by themselves can showcase our restoration work. However, the idea of expanding our interpretation to restoration sites will be considered in our community outreach program.

Year 1 (FY1998)
- Develop a community outreach program to increase awareness of Hawai'i's natural resources and the threats they face.
- Organize volunteer trips for both Lāna'i and off-island groups.
- Monitor use and impacts on self-guided interpretive trail in Kānepu'u unit.
- Conduct refresher training for docents, and promote guided hike opportunity to Lāna'i and off-island groups every 2 months.

Year 2 (FY1999)
- Implement community outreach program.
- Organize volunteer trips for both Lāna'i and off-island groups.
- Monitor use and impacts on self-guided interpretive trail in Kānepu'u unit.
- Conduct refresher training for docents, and promote guided hike opportunity to Lāna'i and off-island groups every 2 months.

Years 3 – 6 (FY2000 – 2003)
- Continue community outreach program.
- Organize volunteer trips for both Lāna'i and off-island groups.
- Monitor use and impacts on self-guided interpretive trail in Kānepu'u unit.
- Conduct refresher training for docents, and promote guided hike opportunity to Lāna'i and off-island groups every 2 months.

Personnel, Equipment, and Facilities

This plan will be implemented by a team that is overseen by the O'ahu/ Lāna'i Program Director (20% time), and includes the O'ahu/ Lāna'i Field Coordinator (25% time), two full-time Field Technicians, and the O'ahu/ Lāna'i Program Assistant (25%). The Field Coordinator oversees all field work, with responsibilities for restoration; the Field Technicians are responsible for all threat control, and assist with restoration work. A short-term (3-month) full-time laborer is included annually to assist with re-fencing. The Program Director oversees all work and is responsible for planning, budgeting and reporting; the Program Assistant helps with purchase of supplies, reporting, and the interpretive program.
In FY1998, approximately 60% of staff time will focus on threat control programs (weeds and ungulates); 20% on restoration, research, and resource monitoring; 10% on community outreach; and 10% on planning and administration. Over the course of this plan, staff time will shift more towards restoration and community outreach, with a corresponding decrease in threat control. By the year 2003, staff time is expected to be spent 40% on threat control, 30% on restoration, research, and resource monitoring, 20% on community outreach, and 10% on planning and administration.

The Stewardship and Hawai'i Natural Heritage Program (HINHP) Ecologists assist with restoration implementation, monitoring, and research. Additional on-going support is provided by other Conservancy staff, including the Director of Science and Stewardship, Environmental Educator, and the Project Manager. This assistance is for annual planning and reporting, and community outreach. HINHP will assist in map preparation, and the implementation of GPS technology.

Facilities used to support the Kānepu'u Preserve program include a baseyard with a small, inner "office," office space in Honolulu for administrative and technical staff, and a greenhouse facility at Lanai Company's nursery.

Socio-economic

Public education and the creation of conservation jobs on Lāna'i are the primary socio-economic benefits expected to result from the proposed project. No negative socio-economic effects are anticipated.

The Nature Conservancy, in partnership with the state, is committed to fostering community awareness of Hawai'i's natural resource and restoration issues, and to using volunteers to help attain management goals. As was previously mentioned, an interpretive program has been developed with guidance from members of *Hui Malama Pono o Lāna'i* and staff of Lanai Company. The current program includes a self-guided interpretive trail in the Kānepu'u unit, and a trail in the Kahue unit open only to visitors accompanied by staff or a docent. Each year, the student body of Lāna'i High and Elementary School, some 300 children plus approximately 70 parent and teacher chaperones, visit Kānepu'u Preserve.

Environmental

This project has benefited, and will continue to benefit the environment, by maintaining and enhancing a rare native ecosystem, and preserving rare and endangered Hawaiian plants. Seven rare plant taxa currently known from Kānepu'u Preserve are better protected as a result of this project. Plans include propagation and outplanting of at least two endangered plant species: *Gardenia brighamii* and *Santalum freycinetianum* var. *lanaiense*. Although no endangered animals are known from Kānepu'u Preserve, management staff will investigate the feasibility of reintroducing the endangered 'ua'u, or dark-rumped petrel, to Lāna'i.

Because of its accessibility and broad range of restoration problems, Kānepu'u is expected to become an important study site for testing and refining restoration techniques. The techniques developed at Kānepu'u should be directly applicable to similar areas in Hawai'i, and elsewhere.

III. SUMMARY OF MAJOR IMPACTS

Major Impacts – Positive

- Elimination of ungulates and maintenance of seven fenced, ungulate-free areas.
- Reduction of the range of habitat-modifying weeds and prevention of introduction of new problem weeds.
- Tracking of biological resources in the preserve and evaluation of changes in these resources over time to identify new threats.
- Logistical and financial support to approved research projects will improve management understanding and protection of the preserve's resources, as well as other natural areas in the state. In particular, innovative techniques developed for restoring Kānepu'u's native forests are expected to be applied to tropical dryland ecosystems in other settings.
- Prevention of extinction of rare species in the preserve.

Major Impacts – Negative

One potential impact is the accidental introduction or spread of new weed species by managers or visitors on equipment, supplies, or transport vehicles. Also, because herbicides will sometimes be used to control habitat-modifying weeds in the preserve, there is a remote possibility of localized soil contamination. Because we are using diphacinone bait blocks to control rats, there is a small chance that non-target animals will be poisoned.

It is also possible that there will be some visitor impacts along the self-guided trail in Kānepu'u unit. There are no rare plants near the trail, but unescorted visitors might begin harvesting native trees for woodworking. We might also begin to see excessive gathering of native plants in the vicinity of the trail. However, with care, no major negative impacts are expected to result from the proposed activities.

IV. ALTERNATIVES CONSIDERED

Although we (the Conservancy) considered a variety of alternatives involving lower levels of management, we decided that the actions outlined in this assessment are all necessary for the immediate protection and eventual restoration of Kānepu'u's rare dryland ecosystem. Slowing the pace of management could jeopardize progress made in controlling deer and habitat-modifying weeds. Similarly, a no-action alternative would promote the loss of both native species and one of Hawai'i's few remaining native dryland forest communities.

V. PROPOSED MITIGATION MEASURES

To prevent the accidental introduction or spread of weed or other pest species, staff, volunteers, and hike participants entering sensitive portions of the preserve will be required to clean their clothing, boots, equipment, and camping gear of soil and plant material. We also monitor the areas along roads and trails to detect new alien species introductions. To prevent contamination of soil with herbicides, all field staff have been trained in the safe application of approved herbicides. Herbicides are used according to label instructions, and all chemical use is in compliance with the state Department of Agriculture's pesticide branch.

Similarly, the rodenticide diphacinone is used in accordance with the label information, which includes notifying the Department of Agriculture before planned use of this pesticide. We utilize tamper-proof bait boxes designed to minimize the chances of non-target animal poisoning. The Nature Conservancy will continue to work with the informal Toxicant Registration Working Group to employ the safest, most effective rodent control techniques. With regard to visitor impacts, we will monitor the area along the self-guided trail, and discontinue public use of the trail if we detect significant such impacts.

VI. DETERMINATION

No significant negative impacts to the environment are expected to result from the implementation of the proposed activities.

VII. FINDINGS, AND REASONS SUPPORTING DETERMINATION

In summary, all activities are expected to be beneficial, or to have no negative effect. The proposed activities are expected to benefit native species (including rare and endangered plants) and a rare native ecosystem. Specific benefits include: protection from deer and other harmful alien animals, control of invasive alien plants (which could displace native species), ecosystem restoration, and propagation and outplanting of rare plants. Public education is one significant socio-economic benefit.

The risk of significant negative impact is low. Through a rigorous cleaning and monitoring program, the introduction or spread of new weed species by humans is expected to be minimal. Management-related impacts on historical resources in the area will be avoided. Furthermore, the risk of herbicidal contamination is low because 1) only small volumes of approved herbicides will be used, 2) staff are well-trained in herbicidal application, and 3) all chemical use will be in compliance with the state Department of Agriculture's pesticide branch. Compliance with the requirements of the state Department of Agriculture will also minimize the chances of non-target animal poisoning resulting from the use of rodenticides.

VIII. EA PREPARATION INFORMATION

This Environmental Assessment was prepared by staff of The Nature Conservancy, in consultation with Peter Schuyler and Betsy Gagné, staff members in the Department of Land and Natural Resources/Division of Forestry and Wildlife/Natural Area Reserves System program. The primary preparer is:

Wendy Fulks, Project Manager
The Nature Conservancy
1116 Smith Street, Suite 201
Honolulu, Hawai'i 96817
(808) 537-4508

This environmental assessment incorporates many sections and figures from the Kānepu'u Preserve Long Range Management Plan (e.g., all maps, descriptions of resources, and proposed activities). Please refer to the management plan for details pertaining to the project budget.

IX. APPENDICES

APPENDIX 1
COMMENTS RECEIVED DURING CONSULTATION
(AND RESPONSES)

LINDA CROCKETT LINGLE
Mayor
CHARLES JENCKS
Director
DAVID C. GOODE
Deputy Director
AARON SHINMOTO, P.E.
Chief Staff Engineer

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration
EASSIE MILLER, P.E.
Wastewater Reclamation Division
LLOYD P.C.W. LEE, P.E.
Engineering Division
BRIAN HASHIRO, P.E.
Highways Division
Solid Waste Division

November 7, 1996

Mr. Michael Buck
State of Hawaii
Department of Land and Natural Resources
888 Mililani Street, Suite 700
Honolulu, Hawaii 96813

Dear Mr. Buck:

SUBJECT: PELEKUNU PRESERVE, KAPUNAKEA PRESERVE AND KANEPUU PRESERVE 6 YEAR MANAGEMENT PLAN

We reviewed the subject application and have the following comment.

1. A Solid Waste Management Plan shall be prepared which addresses the disposal of non-native species removed from the preserve, i.e., ungulates, small mammals, and weeds.

If you have any questions, please call Aaron Shinmoto at 243-7845.

Sincerely,

Charles Jencks
Director of Public Works and
Waste Management

AS:co/mt
xc: Engineering Division
Solid Waste Division
Wastewater Reclamation Division
G:\LUCA\CZM\PRESERVE.WPD

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LINDA CROCKETT LINGLE
Mayor

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI HAWAII 96793

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

October 15, 1996

Mr. Michael Buck
Division of Forestry and Wildlife
Administrator
State of Hawaii
Department of Land and Natural Resources
Kendall Building
888 Mililani Street, Suite 700
Honolulu, Hawaii 96813

Dear Mr. Buck:

Re: Natural Area Partnership Program

We received your letters regarding written comments for the plans at the Kanepuu, Kapunakea and Pelekunu Preserves. We have no comment to make at this time except that we'll circulate the Preserve plans to our departments for their review with comments back to Mr. Peter Schuyler.

One thing which we can do is have our Fire Department work with your department and the Nature Conservancy to formulate a Fire Response and Prevention Plan to protect Kanepuu on Lanai.

Thank you for sharing the plans by the Nature Conservancy. It is nice to see the partnership that has evolved to safeguard our environment.

Very truly yours,

RICHARD H. HAAKE
Managing Director

The Nature Conservancy of Hawaii

[illegible]

December 10, 1996

Mr. Charles Jencks
Director of Public Works and Waste Management
Maui County
200 South High Street
Wailuku, HI 96793

Dear Mr. Jencks,

Your 11/7/96 memorandum to Michael Buck was forwarded to The Nature Conservancy for response. The memorandum stated that Solid Waste Management Plans should be prepared to address the disposal of non-native species from Pelekunu, Kapunakea, and Kanepuu Preserves.

I recently spoke with a member of your staff, Mr. Aaron Shinmoto. Mr. Shinmoto advised me that we would only need to prepare Solid Waste Management Plans *if we are disposing of non-native species in county land fills*. This is not the case, and we have no future plans to utilize county land fills for this purpose. Non-native plants are left inside the preserves where they can serve as mulch. Hunters usually recover the animals they kill; other animals such as those captured in traps are not taken outside the preserves.

I hope that I have adequately addressed your comment. Please contact me at 537-4508 if you have any additional concerns or questions related to these projects.

Sincerely,

Wendy Fulks
Project Manager

cc
Peter Schuyler
Alenka Remec
Barrie Morgan
Ed Misaki
Mark White

A3

November 5, 1996

'96 OCT 37 P4:21

Dear Mr. Schuyler,

The following comments by the Hawaii Audubon Society are in regards to the planned management actions for the Kanepuu and Kapunakea Preserves managed by the Nature Conservancy of Hawaii (TNCH). We hope they will be useful and instructive to the Environmental Assessment process.

Kanepuu

Small Mammal Control:

The plan does not mention the possible use of second generation anticoagulants and other rodenticides for small mammal control. While this may be due to the lack of approval by the Department of Agricultural or their unproven effectiveness in forest settings, the success of island rat eradication programs in New Zealand, American Samoa, and most recently, Eastern and Spit Islands at Midway Atoll suggests their applicability for other habitats. These rodenticides and second generation anti-coagulants include bromethalin, an ATP inhibitor available in weather resistant blocks under the product name Vengeance, and the acute toxicant brodifacoum, an anti-coagulant available as WeatherBlok. One advantage of these products is that they require less consumption of bait for lethal doses, preventing bait avoidance problems. Risks include non-target primary and secondary poisonings. It is unclear from the plan whether any secondary poisonings have already occurred, and we would recommend re-evaluation of the current rodent control program if significant impacts to pueo are observed. However, risks to pueo or other non-target species could be minimized by frequent (ideally daily) collection of rat or mice carcasses, proper bait station setup and maintenance, and the use of bromethalin alone, which has a half-life of 5.6 days in mammalian tissues.

While we strongly support the possible re-introduction of the dark-rumped petrel to Kanepuu Preserve, resolution of secondary poisoning issues and the effectiveness of the rodent control program needs to be demonstrated first before any re-introduction effort.

Given resource constraints upon Lanai/Oahu TNCH staff, a volunteer bait/trap monitoring program may prove feasible in the future. This volunteer monitoring program could be achieved in conjunction with the development of the 750 meter self-guided trail in the Kanepuu Unit to create a sense of visitor stewardship toward our natural resources as a complement to the educational experience. The Hawaii Audubon Society strongly supports the development of this trail and is interested in possibly assisting in its construction.

Kapunakea

Small Mammal Control:

Please refer to the above comments regarding the use of second generation anti-coagulants and other rodenticides. We support the control of small mammals in the preserve providing that the program's research, design, and monitoring needs are adequately met.

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Feral Ungulate Control:

If not already planned or in use, we recommend the use of hog wire fencing with graduated mesh sizes to restrict both piglets and large boars from management units. While the Hawaii Audubon Society supports the outlined combination of ungulate removal methods (including the use of snares in the appropriate management units), we also recommend the use of one-way gates to assist in ungulate removal. One-way gates offer a humane and effective method to lower feral pig population levels if properly installed in appropriate areas. The gates are relatively easy to install during fence construction and nearly maintenance free.

Monitoring and Research:

We strongly support the annual forest bird surveys, as well as any future plans for re-introductions of native forest birds that have become locally extinct in West Maui, contingent upon the success of avian disease research and propagation efforts.

Thank you for this opportunity to comment on the proposed long-range management plans. We look forward to further participation in the Environmental Assessment process.

Sincerely,

Daniel K. Sailer
Conservtaion Chair, Hawaii Audubon Society

The Nature Conservancy of Hawaii

[illegible]

December 10, 1996

Daniel K. Sailer, Conservation Chair
Hawaii Audubon Society
212 Merchant Street, Suite 320
Honolulu, HI 96813

Dear Mr. Sailer,

Your 11/5/96 letter to Peter Schuyler was forwarded to The Nature Conservancy for response. Thank you for your interest and your well-considered comments regarding management planned at Kanepuu and Kapunakea Preserves. Our responses to your comments are summarized below:

Small mammal control

The Nature Conservancy recognizes the need for more effective rodent control methods that can be applied safely in Hawaii's native forests. As you probably know, there is a "toxicant registration working group" that has been grappling with this issue for the past several years. The Nature Conservancy will continue to work with its partners to facilitate the registration of more effective (and safe) rodent toxicants for use in Hawaii's natural areas.

You expressed some concern about the possibility of secondary poisonings resulting from our current use of diphacinone in Kanepuu Preserve. Two studies conducted in Hawaii showed that the majority of radio-collared rodents that died from eating diphacinone bait blocks expired underground or in areas where they would be inaccessible to pueo or Hawaiian hawks. As a result, we believe that the risk of secondary poisoning to pueo is very small. As you suggest, we will re-evaluate the current program if significant impacts to pueo are observed.

Re-introduction of dark-rumped petrel

We agree that an effective rodent control program would be needed prior to re-introducing the dark-rumped petrel to Kanepuu Preserve, or elsewhere on Lanai.

[illegible]

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Volunteer opportunities

The self-guided trail in Kanepuu unit is a fairly small project that will be completed with community assistance in the next few months. (To prevent visitor impacts, the trail will be in an area that does not contain rare plants. Because our rodent control program focuses on controlling rats in the vicinity of rare plants, we plan to keep these two tasks separate.) The Nature Conservancy does use volunteers for other work at Kanepuu, and we are interested in teaming up with the Hawaii Audubon Society on another, more suitable project.

Ungulate control at Kapunakea Preserve

We are already using the hog wire fencing you recommend at Kapunakea Preserve. We are also investigating the use of one-way gates at Kapunakea.

Monitoring and research at Kapunakea Preserve

Although the management plan you reviewed called for annual forest bird surveys, this work will be dropped from the environmental assessment and the final FY1998-2003 long-range plan. Instead, we will support the work of the statewide forest bird monitoring teams which currently monitor transects on West Maui every 4-5 years. Due to limited management funds, this change is necessary to allow us to focus on higher priority work such as ungulate and weed control.

With regard to re-introducing forest bird species that have been extirpated on West Maui, we are open to working with qualified partners toward this end. However, because such work would require a large research component, and because we are primarily focused on land management, The Nature Conservancy would probably not be willing to lead such a project.

Once again, thank you for participating in the planning process. Please do not hesitate to contact me at 537-4508 if I have not adequately addressed your comments.

Sincerely,

Wendy Fulks
Project Manager

cc
Peter Schuyler
Barrie Morgan
Mark White
Alenka Remec

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3108
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

OCT 3 1 1995

In Reply Refer To: MRL

Michael Buck
Division of Forestry and Wildlife Administrator
State of Hawaii
Department of Land and Natural Resources
Kendall Building
888 Mililani Street, Suite 700
Honolulu, HI 96813

Dear Mr. Buck:

Thank you for the opportunity to review the long-range management plans for Pelekunu Preserve (Molokai), Kanepuu Preserve (Lanai), and Kapunakea Preserve (West Maui) that will be used to prepare environmental assessments as part of the State Natural Area Partnership Program contract renewal process. Overall, the Service believes the management plans do an excellent job of identifying the resource needs of the preserves and make satisfactory management recommendations. However, the Service does offer the following specific comments for your consideration:

Pelekunu Preserve

1. Alien Species Control:

   a. The deer problem is a very serious threat and should be addressed much sooner than the proposed six year waiting period. The Service recommends that The Nature Conservancy (TNC) control deer at Pelekunu in the same manner as outlined in the Kanepuu preserve management plan.

   b. Because the plan does not indicate where the rare plants and animals are, it is difficult to know if the management actions adequately address these species. If any plants occur in areas not now slated for ungulate control, spot-fencing of rarer species should be considered.

   c. Along with measuring ungulate activity, changes in vegetation should also be measured to determine if the 10% ungulate activity ceiling is sufficient to allow vegetation to recover.

   d. This plan seems to indicate that only *Clidemia hirta* is being actively controlled and that other priority pest plants will only be monitored until 1999 when methods for their control will be developed. This seems inadequate, considering the number of habitat modifying species in this area.

   e. There is no mention of rat control. If rats are a problem in Pelekunu, this threat should be addressed.

   f. In addition to using the index outlined in the plan to determine success of feral ungulate and pig removal, TNC should examine the use of statistical procedures based on catch-perch-unit-effort of hunters.

2. Resource Monitoring: Extremely rare plants should be monitored more frequently than every three years. The plan does not specify what data will be collected when rare plants are monitored. The Service recommends contacting Gary Ray at the Center for Plant Conservation (808-848-4177) and Linda Pratt at the United States Geological Service, Biological Services Division (808-967-8211) for suggestions on monitoring procedures.

Kanepuu Preserve

1. Alien species control: A representative sample of fruits of lama (*Diospyros sandwicensis*) and/or iliahi (*Santalum freycinetianum* var. *lanaiensis*) could be examined to monitor rat damage.

2. Fire control: Grass control should be initiated to reduce fuel loads.

3. Resource Monitoring:

   a. Wild and outplanted rare plant individuals should be monitored. See comments under 1.c. for Pelekunu.

   b. Vegetation monitoring should be conducted with mapping to determine vegetation recovery with the removal of deer.

Kapunakea Preserve

1. Resource Monitoring: Rare species should be monitored to determine if management actions are successful.

A6

Again, thank you for the opportunity to participate in the environmental assessment preparation process. If you have any questions about our comments, please contact Wildlife Biologist Michael Lusk (phone: 808/541-3441; fax: 808/541-3470).

Sincerely,

Brooks Harper

Brooks Harper
Field Supervisor
Ecological Services

The Nature Conservancy of Hawaii

• 1116 SMITH STREET • HONOLULU, HAWAII • 96817 • PH: (808) 537-4508 • FAX: (808) 545-2019

December 10, 1996

Brooks Harper, Field Supervisor
Ecological Services
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3108
Box 50088
Honolulu, HI 96850

Dear Mr. Harper,

Your letter to Michael Buck was forwarded to The Nature Conservancy for response. Thank you for your overall support of our plans, and for your well-considered suggestions regarding management planned at Pelekunu, Kanepuu, and Kapunakea Preserves. Our responses to your comments are summarized below:

Pelekunu—alien species control

a. We agree that axis deer are a serious threat at Pelekunu; unfortunately, we do not currently have a feasible, effective control method for deer. While the Conservancy has had success controlling this species at Kanepuu Preserve on Lanai, the methods used there can not be applied at Pelekunu. For example, we have considered using fencing to exclude goats and pigs from large portions of Pelekunu, but decided that the area's steep terrain precluded this approach. Pelekunu's remote location and thick vegetation also make hunting for deer more difficult, and much less efficient, than hunting in settings such as Kanepuu Preserve. Deer are also much more elusive than goats, and cannot be caught with the aid of dogs as pigs are.

As we stated in the management plan, The Nature Conservancy is working with the local community, through the Molokai Hunters Working Group, to address ungulate control issues on Molokai. The Conservancy and the Group agree that in areas such as Pelekunu, pigs and goats are currently a higher priority for control.

b. Regarding the need to protect rare plants from ungulates, we will consider spot-fencing of rare species on a case-by-case basis. As you probably know, the Conservancy has recently installed fences around some rare plant populations in Kamakou Preserve, with funding from the Fish and Wildlife Service. Decisions to fence specific plants at Pelekunu will be based primarily upon the perceived level of threat, rarity, and terrain.

International Headquarters: 1815 North Lynn Street, Arlington, Virginia 22209

c. Your comment refers to our ungulate control goal for the upper valley (activity sustained at 10% or less), and suggests that we measure vegetation change to determine whether this level of ungulate control allows for vegetation recovery. We do measure vegetation changes within the preserve as part of our resource monitoring program; these data may provide some information concerning vegetation recovery as it relates to ungulate levels. In addition, we are supporting Dr. Peter Vitousek who is researching the effects of low levels of ungulates in the adjacent Kamakou Preserve. We expect Dr. Vitousek's results to be applicable to Pelekunu and other natural areas in Hawaii. Finally, years of field observations by experienced staff indicate that Pelekunu's vegetation can maintain itself, and recover, in places where ungulate activity levels are near 10%.

d. We agree that the Conservancy needs to begin focusing on additional habitat-modifying weeds (besides Clidemia) in Pelekunu Preserve. However, several years will be needed to do the work necessary to implement effective control programs. For example, we need to determine which species deserve immediate attention, identify those areas in which control should focus, determine suitable control methods, set realistic management goals, and establish procedures for measuring progress.

e. The Pelekunu long-range management plan does not contain a small mammal control program because rats are not known to be an immediate threat to the preserve's rare species. Our rare plant monitoring program should alert us to new threats (including rats), and we will implement control as needed. In fact, with financial assistance from the Fish and Wildlife Service, The Nature Conservancy has recently increased its efforts to control rats in the vicinity of rare snail populations in Kamakou Preserve.

f. We are currently working with a National Park Service wildlife biologist on Molokai who is developing statistically sound methods to determine the success of ungulate control programs. Our staff on Molokai are not familiar with the "catch-per-unit-effort" procedures you mention. I would appreciate it if you could provide us with more information on this approach.

Pelekunu—resource monitoring

We have consulted local experts, including Gary Ray, about our rare plant management and monitoring programs at Pelekunu. We will consider increasing monitoring frequency or changing our current monitoring procedures if that is Dr. Ray's recommendation.

Kanepuu—alien species control

You suggest examining fruits from lama and/or iliahi as a way to monitor rat damage. Rather than focus on the incidence of seed predation for certain species, The Nature Conservancy would like to determine the effects of rats on native forest regeneration. Answering this question may involve examination of lama and/or iliahi fruits. Examining the effects of rodents on forest regeneration is one of our most important research priorities (see Research Needs List Appendix). To date, we have worked with USDA's Animal Damage Control staff to determine rat population levels in the preserve. We would also welcome help from Fish and Wildlife Service staff or other experts who could assist us in addressing this question.

Kanepuu—fire control

The control of alien grasses at Kanepuu is a difficult problem. The need to reduce fuel loads must be weighed against the threat of erosion. We believe that our current program, regularly mowing grass to create a fuel break around the perimeter of the fences, is the best way to address this problem for now. In the long term, the control of alien grasses will be addressed through our restoration program. For example, in fiscal year 1998 we will implement trials to determine effective techniques for planting native species within grassy areas. The goal will be for these native plants to eventually shade out the grass.

Kanepuu—resource monitoring

In response to your comments, we have added annual monitoring of rare plants to our plan. Monitoring of outplanted individuals is scheduled to begin in Year 5. We have also added a task to document vegetation changes that may be attributed to the removal of deer from Kanepuu unit. This work will commence in fiscal year 1999. We have not yet determined the methods to be used.

Kapunakea—resource monitoring

Our primary emphasis at Kapunakea is the control of habitat-wide threats such as ungulates and priority weeds. We expect to be able to increase the work we are doing to protect individual species after pigs have been eliminated, and the spread of weeds such as Tibouchina and strawberry guava are in check. Staff do monitor a subset of the preserve's rare plants in order to keep apprised of their health and reproductive status. In addition, we have done some monitoring of rare snail populations. However, the rare species monitoring currently planned at Kapunakea is *not* designed to document the effectiveness of management. The Nature Conservancy does not have the capacity to carry out this type of monitoring; however, we would support others who were interested in conducting this work at Kapunakea Preserve.

Once again, thank you for participating in the planning process. Please do not hesitate to contact me at 537-4508 if I have not adequately addressed the Service's comments.

Sincerely,

Wendy Fulks
Project Manager

cc
Peter Schuyler
Barrie Morgan
Mark White
Alenka Remec

A9

JOHN D. CAYETANO
GOVERNOR
STATE OF HAWAII

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

'96 NOV -5 A10:10

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

November 1, 1996

MEMORANDUM

TO: The Honorable Michael D. Wilson, Chairperson
Department of Land and Natural Resources

ATTN: Michael Buck, Administrator
Division of Forestry and Wildlife

FROM: Kali Watson, Chairman
Hawaiian Homes Commission

SUBJECT: Request for Comments on Planned Management Actions for Pelekunu Preserve (Molokai), Kanepuu Preserve (Lanai), and Kapunakea Preserve (West Maui)

Thank you for allowing our review of the six-year management plans for the three subject preserves.

The Pelekunu Preserve is of interest to the Department of Hawaiian Home Lands (DHHL) because we have jurisdiction over more than 25,000 acres and 812 homestead leases on Molokai.

The following comments relate to the proposed management plan for the Pelekunu Preserve.

Program 1: Non-native Species Control

As you know, Molokai families are very concerned about the preservation of natural and cultural resources and the threat of feral ungulates to native plants and wildlife. They would like the opportunity to continue to hunt for home consumption and to control the population of deer, goats and pigs. (Page 10)

Given the economic conditions on Molokai and upcoming welfare program reforms, it is likely that this demand will increase. Provisions should be made for Molokai residents to have priority for on-island hunting.

If there is not enough local demand, hunters from off-island should be allowed. Out-of-state shooting clubs might also be invited as part of an "eco-tourism" program.

Wire snaring or shooting animals from aircraft without retrieving the carcasses should not be allowed.

Please explain why you will be only monitoring and not undertaking efforts to control the rising numbers of axis deer in the preserve. (Page 11) Are they less destructive to the native habitat? Are they less popular to hunters?

Efforts should be made to evaluate the role of ungulates (positive or negative) relative the the spread of habitat-modifying weeds such as Clidemia hirta. (Page 12)

We are concerned about the use of fungal or other biocontrol agents to combat the spread of weeds. (Pages 12 and 13) We need to know what native plants or animals may come be affected as the original target hosts are reduced and eliminated. Past experiences have taught us that introduction of alien species can result in problems far greater than those we originally set out to solve.

Program 3: Community Outreach

You note that water diversion is a potential threat to Pelekunu Preserve's stream ecosystems. (Page 17) We support the strategy of continuing involvement with the Molokai Water Working Group which advises the State Commission on Water Resource Management.

We also applaud efforts to educate and involve the community in programs and projects to protect natural and cultural resources.

If you have any questions, please call Joe Chu of our Planning Office at 586-3838.

4170L9

LINDA CROCKETT LINGLE
Mayor

DAVID W. BLANE
Director

GWEN OHASHI HIRAGA
Deputy Director

COUNTY OF MAUI
PLANNING DEPARTMENT
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 16, 1996

'96 OCT 23 AM 8:36

Mr. Peter Schulyer
Department of Land and Natural Resources
Division of Forestry and Wildlife
888 Mililani Street, Suite 700
Honolulu, Hawaii 96813

Dear Mr. Schulyer:

RE: KANEPU'U PRESERVE

Thank you for the opportunity comment on the Long-Range Management Plan for the Kanepu'u Preserve on Lanai. The proposed plan supports the County's long-range objectives as identified in our General Plan, 1990.

In our General Plan, a specific objective identified for Lanai is "to carefully monitor and evaluate the changing economic base of the island of Lanai." A specific policy of this objective is "to encourage development of land management plans to prevent deterioration of watershed areas," which includes the Kanepu'u Preserve area. Efforts to preserve native habitats and species also ensure that our watersheds are protected.

If additional clarification is required, please contact Ms. Colleen Suyama of my office.

Very truly yours,

Gwen Ohashi Hiraga

for DAVID W. BLANE
Director of Planning

DWB:CMS:cmp
cc: Gwen Ohashi Hiraga, Deputy Planning Director
Clayton Yoshida, Planning Program Manager-Land Use Management Division
Colleen Suyama, Staff Planner
General File
Project File (g:\planning\all\colleen\kanepuu.ltr)

A-11

DIVISION OF AQUATIC RESOURCES - MAUI
DEPARTMENT OF LAND & NATURAL RESOURCES
130 Mahalani Street
Wailuku, Hawaii 96793
Phone # (808) 243-5327
FAX #(808)243-5326
October 25, 1996

To: Michael Buck, DOFAW Administrator

Through: Bill Devick, Acting DAR Administrator

From: Skippy Hau, Aquatic Biologist

Subject: Management Plans For Kapunakea, Kanepuu, & Pelekunu Preserves (Fiscal Years 1998 - 2003)

During 1994, aquatic resources surveys on Maui found that opae kuahiwi (*Atyoida bisulcata*) and 'o'opu alamo'o (*Lentipes concolor*) would make an excellent indicator species for healthy streams that flow to the ocean. They have been found in both intermittent and perennial streams.

Kapunakea Preserve

Kapaloa Stream (Hawaii Stream Code No. 6-1-07.006), is a tributary of Honokowai Stream. Adult opae have been found above the diversion in Kapaloa Stream with Andy Yuen, U.S. Fish and Wildlife Biologist on Dec. 20, 1988 and again with Ron Englund, a consultant, on Sept. 15, 1992. The site was about 1550-feet elevation. Exotic plant species were noted in most of our survey areas.

Both species have been confirmed at elevations over 2,000 feet on Maui. The proposed Kapunakea Preserve could have a limited number of these two species present in the lower stream areas (Unit 3).

Pelekunu Preserve

The proposed plan recognizes the outstanding aquatic resources in the stream. The proposed resource monitoring will include aquatic species. Bill Puleloa, the Moloka'i aquatic biologist will help in establishing a monitoring program for aquatic resources in Pelekunu Stream.

Kanepuu Preserve

The preserve will help protect dryland forest areas and does not involve any stream areas.

1.08

The three proposed management plans will try to control weeds and prevent further establishment of exotic species. The plans help give native species a chance to survive. The establishment of native plant species in riparian areas should help to reduce runoff and sediment. It will also help maintain watershed areas which contributes to water recharge for each island.

In cases where riparian vegetation can be stabilized or exotic species controlled, a main goal of reducing sediment and turbidity will eventually lessen the long term impacts on the shoreline and nearshore ecosystems. If possible, the restoration of a minimum flow in diverted areas could help in stabilizing aquatic ecosystems and improve lost watershed structure and functions.

NOV 1 8 1996

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

DEPUTIES
Gilbert Coloma-Agaran

AQUACULTURE DEVELOPMENT PROGRAM
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HISTORIC PRESERVATION DIVISION
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WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

November 14, 1996

MEMORANDUM

TO: Michael Buck, Administrator
Division of Forestry and Wildlife

FROM: Don Hibbard, Administrator
State Historic Preservation Division

LOG NO: 18255
DOC NO: 9610SC07

SUBJECT: Chapter 6E-8 Historic Preservation Comments on the Draft Environmental Assessments for the Kanepuu, Kapunakea, and Pelekunu Preserves on the Islands of Lana'i, Maui, and Moloka'i

We provide the following comments on the draft Environmental Assessments (EAs) prepared for three preserves managed by The Nature Conservancy (TNC) and funded under the State Natural Area Partnership Program (NAPP). The three preserves are as follows: Kanepuu, on the Island of Lana'i; Kapunakea Preserve on West Maui; Pelekunu Preserve on Moloka'i.

Kanepuu Preserve, Lana'i

The Kanepuu Preserve comprises seven discontiguous preserve areas, ranging in size from 13 to 368 acres, with a total size of 590 acres. All of the Preserve's units are in north-central Lana'i. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division. In addition, Dr. Boyd Dixon, Director of the Department of Hawaiian Homelands Archaeological Crew on Maui, conducted a field inspection of the proposed alignment for the interpretive trail in September 1996 in the two largest units, Kahue and Kanepuu Preserves. Dr. Dixon did not observe any surface evidence of cultural remains or historic sites in either Preserve. The only known site nearest to Kanepuu Preserve is the *'ulu maika* playing field (SIHP No. 50-40-98-116) described by Kenneth Emory in 1924; the site was not relocated during the Statewide Inventory in 1974, and is presumed to be destroyed; Site -116 was formerly on a flat about 1 kilometer south of the Kanepuu Preserve fenceline.

Kapunakea Preserve, Maui

The Kapunakea Preserve comprises 1,264 acres in West Maui. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division. In addition, Ms. Theresa Donham of our Maui office made a brief field inspection of a small portion of the Preserve in November 1994. According to our records, at least two significant historic sites -- the Honokawai Trail and structures associated with Pioneer Mill -- are known to be within the Preserve's boundaries. In addition, a taro agriculture complex has been recorded in the Honokowai Valley between 800 and 1000 feet above sea level, with remnant portions found below those elevations (*Archaeological Surface Survey, Honokowai Gulch, Ka'anapali*, Maui. 1977. Davis). Furthermore, as indicated in materials previously provided to the Nature Conservancy by our office (see attached copies of memoranda 9412KD28 and 9412KD40), historical data on Land Commission Awards, for example, suggest a high likelihood of historic sites being present in other portions of the Kapunakea Preserve.

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Pelekunu Preserve, Moloka'i

Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject area. The Pelekunu Preserve comprises 5,759 acres in northeast Moloka'i. The Preserve encompasses the Pelekunu Stream valley and immediately surrounding uplands. According to our records, at least eight historic sites form what is called the Pelekunu Valley Agricultural Complex (SIHP No. 50-60-05-280), a large pre-Contact taro agricultural complex: Hekilikahi or Kekilikaha Heiau (SIHP No. -278); the *pu'uhonua* of Kukaua (SIHP -279); the shrine of the *o'opu* god (formally Summers' Site 280); a house site (SIHP No. -281); Ha'upu Heiau (SIHP No. -282); Ka'aiku Heiau (SIHP No. -283); Manini'aiake Heiau (SIHP No. -284); the Cave of Anapuhi (SIHP No. -285). Of these properties, it appears that SIHP Nos. -278 and -279 lie within the borders of the Pelekunu Preserve. Since Pelekunu Valley has never undergone an archaeological inventory survey, undoubtedly more historic sites, particularly those related to taro cultivation, are likely to be present within the Preserve's boundaries.

Determinations of Effect on Historic Sites

The long-term management plans for the three preserve areas describe five main program areas to be undertaken between 1998 and 2003 in each of the three Preserves: non-native species control (ungulates and weeds), resource monitoring, community or public outreach, emergency and safety, and personnel, equipment, and facilities. Additionally, at specific Preserves, other activities such as fire control at Kanepuu Preserve, will be carried out. In general, these proposed undertakings will have "no effect" on significant historic sites if carried out as described in the three long-term management plans. Our office has two specific concerns applicable to possible future changes in these long-term management plans:

(1) With regard to weed control, we recommend that in the event physical removal of alien species becomes necessary, this should be done only by hand; heavy equipment should not be used.

(2) In view of the emphasis on physical maintenance of the Preserves, and monitoring of native species, the minimal content of the public outreach and interpretative programs in the draft environmental assessments is acceptable at this time. Should, however, these programs be expanded in the future, especially so as to include interpretation of cultural resources, rehabilitation of historic sites within a Preserve, and improvements to historic trails, we recommend that additional work be done prior to implementing any such elements. Such additional work should include a review of the historical and archaeological background data for the Preserve, archaeological inventory survey, and development of appropriate mitigation plans, including preservation and interpretation. All of this additional work should be coordinated with our office so as to ensure appropriate review of any undertaking.

Should you have any questions, please feel free to call Sara Collins at 587-0013.

SC:jen

cc: Ms. Wendy Fulks, The Nature Conservancy, 1116 Smith Street, Suite 201, Honolulu, HI 96817
FAX: 545-2019

APPENDIX 2
RARE PLANTS OF KĀNEPUʻU PRESERVE

SCIENTIFIC NAME	COMMON NAME	HERITAGE RANK (a)	FEDERAL STATUS (b)
Bidens micrantha ssp. *kalealaha**	koʻokoʻolau	G3?T1	LE
Bobea sandwicensis	ʻahakea	G2	—
Bonamia menziesii	—	G2	LE
Gardenia brighamii	nānū, nāʻū	G1	LE
*Haplostachys munroi**	—	GH	—
Hibiscus brackenridgei ssp. *brackenridgei*[1]	maʻo hau hele	G1T1	LE
Nesoluma polynesicum	keahi	G2	—
Nothocestrum latifolium	ʻaiea	G1	—
Santalum freycinetianum var. *lanaiense*	ʻiliahi	G3T2	LE
*Vigna o-wahuensis**	—	G1	LE

* Rare plants known only historically from preserve
[1] Planted in the preserve; not historically known from area

(a) Heritage Rank:
G1 = Species critically imperiled globally (typically 1–5 current occurrences).
G2 = Species imperiled globally (typically 6–20 current occurrences).
G3 = Species very rare and local (typically 21–100 current occurrences).
GH = No known observations in the past 15 years.
G? = Rank tentative, more information needed to confirm.
T1 = Subspecies or variety critically imperiled globally.
T2 = Subspecies or variety imperiled globally (typically 6–20 current occurrences).

(b) Federal Status:
LE = Listed endangered.

APPENDIX 3
RESEARCH NEEDS LIST FOR KĀNEPU'U PRESERVE

This list identifies some of the issues and questions facing the managers of Kānepu'u Preserve. It is intended to be a dynamic list, and to funnel research interest to the highest priority management issues. This list was created in June 1996.

Forest Regeneration

Natural regeneration of Kānepu'u Preserve's forest is the ultimate goal of the restoration program. Large, introduced ungulates have been excluded from the majority of the forest, and competition from introduced plants is being slowed. Other factors limiting "natural" regeneration are yet to be identified. Quantitative observations are needed to identify limiting factors so that management can be designed to minimize these factors.

I. How are rats affecting native forest regeneration? What do rats in Kānepu'u eat? (Specific invertebrates, seeds of native/non-native plants, etc.)
II. Who are key pollinators in the forest*?
III. Are viable seeds being produced*?

*Species of particular interest: *Gardenia brighamii, Nestegis sandwicensis, Myoporum sandwicense, Pouteria sandwicensis, Bobea sandwicensis*

Propagation

Active in-planting is needed to speed restoration, to counter gaps created by weed removal, and to increase the populations of rare plants. We need the most effective techniques for propagation and planting to ensure efficiency.

I. What propagation techniques are used for all taxa at Kānepu'u?
   A. If not known, undertake trials to determine most effective techniques.
II. What seed storage techniques have been used to successfully store viable seeds that can be germinated later?
   A. First step is a synopsis of work to date for taxa found at Kānepu'u.
   B. Additionally, developing seed storage techniques (and subsequent propagation techniques for stored seeds) is needed.
III. What benefit can mycorrhizae add to the outplanting process?

Disease

It is not known to what extent Kānepu'u Preserve's rare and common plants are limited by disease. The U.S. Fish and Wildlife Service (USFWS) recovery plan for *Santalum freycinetianum* var. *lanaiense* mentions a couple of diseases that may affect sandalwood. These are specifically listed here, but an overall reconnaissance of the preserve's vegetation may reveal additional diseases that need to be explored.

I. To what extent are the rare and native plants of Kānepu'u Preserve limited by disease?
II. Do rusts and fungi limit survivability of *Gardenia*?
III. Does the *Santalum* at Kānepu'u suffer from: spike disease, heartwood rot, or seed viability-altering fungus?
   A. What are control techniques for these diseases?

Invertebrates

An initial collection and identification of arthropods at Kānepu'u Preserve was conducted in 1992. It appears that *Nestegis sandwicensis* (olopua) is affected by black twig borer. Ants are another introduced invertebrate. Understanding the role invertebrates play in the native system (whether beneficial or detrimental) is important to ensuring restoration efforts will be effective, and that rare plants are protected.

I. To what extent is black twig borer affecting *Nestegis*?
II. What impact to ants have on invertebrates and native plants (including pollinating invertebrates, and spreading other invertebrates, e.g., scale insects)?

Species-specific Research

Specific observations about native and rare plant taxa, and introduced avifauna in the preserve warrant further research. Some observations are included in USFWS recovery plans for *Gardenia brighamii* and *Santalum freycinetianum* var. *lanaiense*, and the *Manual of the Flowering Plants of Hawai'i*. The role of introduced birds (there are no resident native birds in Kānepu'u Preserve) on seed predation and dispersal is also not understood.

I. What constitutes a "viable" population?
   A. For *Gardenia*, then other endangered species.
II. What causes "banana-type" fruit (without seed) on *Diospyros sandwicensis* (lama)?
III. What role do non-native birds play in seed dispersal and germination (both native and non-native plants)?
IV. What role do non-native birds play in seed predation (specifically native plants)?

Soils and Seed Bank

Abiotic and biotic characteristics of the soil need to be characterized in different parts of the preserve (under full canopy versus eroded areas) to determine necessary soil augmentation for restoration success. Some information has been gathered on these topics, but no comprehensive comparison has been undertaken. Additionally, understanding the seed bank within the forested area, and in the eroded areas or on the forest fringe, is important to identifying potentially low-effort restoration strategies.

I. What is in the soil seed bank?
   A. At the forest edge?
   B. Under a full native canopy?
   C. Under rare plants?
II. What are the biotic characterizations? (e.g., fungi or arthropods living in soil)
III. What are the abiotic characterizations? (e.g., nutrients, moisture content and structure)

APPENDIX 4
DOCUMENTS RELATED TO KĀNEPU'U PRESERVE

Management Plans

Holt, A. 1990. *Kanepuu Preserve, Lanai. 1991 Start-up Plan*. Unpublished.

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APPENDIX 5
COMMENTS RECEIVED, AND RESPONSES,
FOR THE KĀNEPUʻU PRESERVE DRAFT ENVIRONMENTAL ASSESSMENT

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF LAND MANAGEMENT
P O BOX 621
HONOLULU HAWAII 96809-

NOV 25 1996

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

File No.: PM-96-030

MEMORANDUM

TO: Michael Buck, Administrator
Division of Forestry and Wildlife

FROM: Dean Y. Uchida, Administrator

SUBJECT: Request for Comments - Planned Management Actions for Pelekunu Preserve (Molokai), Kanepuu Preserve (Lanai), and Kapunakea Preserve (West Maui)

We have reviewed the Planned Management Actions Report for the subject preserves, and would like to offer the following comments:

Planning and Technical Services

The Nature Conservancy of Hawaii received a Conservation District Use Application in 1987 (SH-2028) for the management of a Natural Preserve System. The permit includes several preserves located throughout the State of Hawaii.

Under Section 13-5-22 (P-7) of the revised Conservation District Rules, which were adopted on December 12, 1994, a Board permit is required for "Plant and wildlife Sanctuaries, natural area reserves and wilderness and scenic areas, including habitat improvements under an approved management plan".

The Nature Conservancy should verify whether the proposed actions at Pelekunu, Kanepuu and Kapunakea, are in conformance with the existing rules.

Thank you for the opportunity to review and provide comments for the Planned Management Actions report for the subject preserves. Should you have any questions, please contact Patti Miyashiro at 587-0430 of our Land Division.

c: Maui Land Board Member

A20

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

FEB 05 1997

MICHAEL D. WILSON
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT S. COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
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BOATING AND OCEAN RECREATION
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CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT
WATER RESOURCE MANAGEMENT

January 30, 1997

MEMORANDUM

To: DEAN Y. UCHIDA, Administrator
Division of Land Management

From: MICHAEL BUCK, Administrator
Division of Forestry and Wildlife

Subject: Reply to Comments on the Draft Environmental Assessments for Kanepuu, Kapunakea, and Pelekunu Natural Area Partnership Projects

CC: Peter Schuyler, DOFAW
Wendy Fulks, The Nature Conservancy

Thank you for responding to our request for comments on the Kanepuu, Kapunakea, and Pelekunu Natural Area Partnership projects. In your 11/25/96 memo you advise that a Board permit is required for these projects. Please be assured that the Division of Forestry and Wildlife (DOFAW) will request the Board of Land and Natural Resources to approve these activities as permitted uses within the Conservation District before authorizing any management work.

It is also worth mentioning that since these three projects were initiated by the Division through its Natural Area Partnership Program they are subject to following all DOFAW procedures and guidelines for Conservation District activities. This includes following Chapter 343 HRS requirements to obtain adequate public review, obtaining Board approval prior to commencement of work, and following approved DOFAW guidelines for management activities within the Conservation District.

If you need any additional information please feel free to call either myself (587-0166) or Peter Schuyler, the Natural Area Reserves Program Manager (587-0054).

BENJAMIN J. CAYETANO
GOVERNOR

JAN 14 1997

GARY GILL
DIRECTOR

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

January 13, 1997

Mr. Michael D. Wilson, Director
Department of Land and Natural Resources
Division of Forestry & Wildlife
P.O. Box 621
Honolulu, Hawaii 96809

Attention: Betsy Gagne

Dear Mr. Wilson:

Subject: Draft Environmental Assessment (EA) for Kanepuu Preserve Natural Area Partnership, Lanai

Chapter 343 HRS, the environmental impact statement law, requires disclosure of the amount of state or county funding for projects. Please include this information in the final EA.

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

Sincerely,

GARY GILL
Director

c: Wendy Fulks, The Nature Conservancy

The Nature Conservancy of Hawai'i
1116 Smith Street
Honolulu, Hawai'i 96817
Phone (808) 537-4508
Facsimile (808) 545-2019

The Nature Conservancy of Hawai'i

February 26, 1997

Gary Gill, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Mr. Gill:

Subject: Draft Environmental Assessment for Kānepu'u Natural Area Partnership Project

Your 1/13/97 letter to the Department of Land and Natural Resources was forwarded to The Nature Conservancy for response. We have added the estimated amount of state funding needed for this project to the Project Description section of the Final Environmental Assessment (EA). According to the current management plan, approximately $787,000 in state funds, over a 6-year period, will support management at Kānepu'u Preserve. However, an opportunity to further accelerate our restoration program might prompt The Nature Conservancy to request a 9-10 percent increase in this budget. This request would take the form of an amendment to our state contract. All such amendments must first be approved by the Board of Land and Natural Resources. None of the work outlined in the EA is contingent upon county funds.

Thank you for your comments. Please contact me at 537-4508 if I have not adequately addressed your questions.

Sincerely,

Wendy Fulks
Project Manager

cc
Peter Schuyler
Alenka Remec
Barrie Morgan