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GOVERNOR OF HAWAII



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DEPARTMENT OF LAND AND NATURAL RESOURCES

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OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

March 16, 1997

Pu'u O Umi NAR Fence  
Constr.

MICHAEL D. WILSON, CHAIRPERSON  
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Mr. Gary Gill, Director  
Office of Environmental Quality Control  
220 South King Street, Fourth Floor  
Honolulu, HI 96813

Dear Mr. Gill,

The Draft Environmental Assessment for fence construction in the Pu'u O Umi Natural Area Reserve was published in the OEQC Bulletin of February 8, 1997. During the public comment period following publication, no negative comments were received. Several agencies wrote in support of this action; their comments reflected the need for actions such as this to protect rare and fragile native terrestrial ecosystems.

We have determined that this project will not have significant negative effect on the environment and have issued a Finding of No Significant Impact. Please publish this notice in the April 8, 1997 OEQC Bulletin.

Applicant: Department of Land and Natural Resources  
Division of Forestry and Wildlife  
Natural Area Reserves System

Approving Agency: Department of Land and Natural Resources

Project Description: Fence Construction, Bog Unit, Pu'u O Umi NAR  
Laupahoehoe I, Hamakua, Hawaii. TMK: 4-9-13-1.

This project involves construction of approximately 1½ mile of fence surrounding and area of 120 acres in the Kohala Mountains. The fence will enclose a montane bog (a rare and fragile native plant community) and prevent the entry of feral pigs.

Reasons Supporting Determination:

The intent of this project is to benefit native species in the project area. Creating a permanent barrier to exclude feral pigs from this fragile plant community will remove the primary threat to its' continued survival. Negative impacts resulting from this project include short term damage to vegetation and the dispersal of weeds along the fence corridor. Most of the path to be crossed by the fence has already been disturbed by pigs; vegetation here is primarily non-native. Further weed spread can be minimized instituting a weed control program in combination with regular fence inspection.

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Contact: Bryon Stevens  
Natural Areas Specialist  
P.O. Box 4849  
Hilo, HI 96720  
(808) 974-4221

Enclosed are copies of the Environmental Assessment, comments received for the Draft Assessment, and a completed OEQC publication form.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Buck", written in a cursive style.

MICHAEL BUCK  
DOFAW Administrator

Enclosures

1997-04-08-HI-PEA-Puu O Umi  
Natural Area Reserve Fence  
Construction

APR 8 1997

**FILE COPY**

ENVIRONMENTAL ASSESSMENT

for

**FENCE CONSTRUCTION**

**BOG UNIT, PU'U O UMI NATURAL AREA RESERVE**

in accordance with

**CHAPTER 343, HAWAII REVISED STATUTES**

Proposed By:

State Division of Forestry and Wildlife  
Natural Area Reserves System

January 1997

I. SUMMARY

Project Name: Fence Construction, Bog Unit, Pu'u O Umi Natural Area Reserve

Proposing Agency: State Department of Land and Natural Resources  
Division of Forestry and Wildlife

Approving Agency: State Department of Land and Natural Resources

Project Location: Laupahoehoe I, Hamakua, Hawaii, TMK: 4-9-13-1.

Agencies Consulted During EA Preparation:

Federal: U.S. Department of Agriculture  
Natural Resources Conservation Service

U.S. Department of Interior  
Fish and Wildlife Service  
USGS, Biological Resources Division  
National Park Service

State: Department of Land and Natural Resources  
Division of Forestry and Wildlife-Hawaii  
Land Division-Hawaii  
Historic Preservation Division  
Natural Area Reserve System Commission

County: Department of Water Supply  
Planning Department

Private: Bishop Museum  
Conservation Council for Hawaii  
Hawaii Audubon Society  
Kamehameha Schools/Bishop Estate  
Kohala Forest Management Group  
Native Hawaiian Advisory Commission  
Native Hawaiian Legal Corporation  
Pig Hunters of Hawaii  
Sierra Club Legal Defense Fund  
Sierra Club, Moku Loa Group  
The Nature Conservancy of Hawaii  
Wildlife Conservation Association of Hawaii, Waimea Chapter

Project Action Summary:

The Division of Forestry and Wildlife (DOFAW), Natural Area Reserves program proposes construction of a fence enclosing a portion of the above parcel as part of ongoing efforts to protect native forest ecosystems, and rare, threatened, and/or endangered flora and fauna found within these ecosystems. The project involves hand clearing of vegetation a corridor no more than six feet wide, and erecting a fence using galvanized steel posts, one strand of barbed wire along the bottom, and thirty-nine inch tall hog wire. Approximately 1½ mile of fence will be built, enclosing an area of 120 acres. The fence will surround a montane bog (a rare and fragile native plant community), and prevent feral pigs from entering the bog.

The project site is located entirely on State owned land, within the boundaries of the Pu'u O Umi Natural Area Reserve. All project lands are within the Conservation District. Maps indicating land ownership and the proposed fence line can be found in Appendix A.

### Project Purpose and Need:

When completed, this fence will permanently exclude feral pigs from fragile native plant communities within the project area. Feral pigs (*Sus scrofa*) pose the greatest threat to existing intact native wet forest and bog areas. Pigs consume and trample understory plants, create conditions for non-native plant infestation and establishment, prevent the recovery of native ground cover vegetation, serve as vectors for the dispersal of non-native plants, and disrupt soil nutrient cycling. The cumulative effects are the decline of intact native ecosystems, including the decline of suitable habitat for threatened and endangered forest birds, plants, and invertebrates.

The project area contains examples of two different types of Hawaiian montane bogs. These plant communities are extremely rare in Hawaii, and ample evidence exists to show that pigs can cause irreversible harm to this fragile environment. Hawaiian bogs are the habitat for many specialized plant and invertebrate species, and while no listed endangered species are known to exist within the project area, many plants found in the area can be considered rare or uncommon, and may receive protected status in the future. See Appendices C and D for a complete listing of the endangered, threatened or rare flora and fauna found within the project area.

Projects such as this are aimed at protection of ecosystems, or plant and animal communities, as opposed to particular species. If long-term viability of rare and endangered native organisms is to be achieved, protection of large tracts of land needs to be achieved. This is in keeping with the USFWS policy of an "ecosystem approach" focusing on management of natural communities, and with the Natural Area Reserve Law, which states a system of reserves be established to "...preserve in perpetuity specific land and water areas which support communities, as unmodified as possible, of the natural flora and fauna..." (Chapter 195, Hawaii Revised Statutes).

## II. PROJECT DESCRIPTION

### General

The proposed fence line will utilize 39" high galvanized hog wire fence fabric with a basal strand of galvanized barbed wire. The fencing fabric will be supported by galvanized steel fence posts placed no more than 10 feet apart along the entire length of the fence line. Shorter steel pins will be used as anchors within the 10 foot span. Vegetation along the fence alignment will be cleared by hand to a width of no more than 6 feet.

### Location

The project area is located on the windward slope of the Kohala Mountains, at an elevation of 3750 feet. It lies on a high plateau bordered on two sides by the headwalls of Waipi'o and Waimanu valleys. Waimea town is five miles to the south. See Appendix A for a maps of the project area.

### Project Progression

Progression of the project is as follows: In the first phase, the alignment of the fence is marked with plastic flagging, and this trail inspected for the presence of rare or endangered plants. If any are found, they will be marked to prevent damage by fence construction crews. If necessary, fence alignment will be shifted to avoid individual plants. No significant plants were discovered during a preliminary botanical survey of the fenceline in January 1997.

During the second phase, woody vegetation is removed from the fenceline with hand and small power tools. As stated above, the area cleared is no more than six feet in width.

The final phase is actual installation of the fence. Materials will be flown in by helicopter. All construction work will be done with hand tools. This construction involves driving galvanized steel fence posts into the ground along the corridor no more than ten feet apart, attaching one strand of galvanized barbed wire along the posts at ground level, and stretching thirty-nine inch high, galvanized hog wire along the posts. Where necessary, anchor posts will be used along the fence, between the posts, to ensure the fencing is tight to the ground.

As fence construction nears completion, every effort will be made to ensure that no pigs remain within the enclosed area. Due to the small size of the area enclosed and the short stature of the vegetation, using a helicopter

to drive animals toward an opening in the wire should be sufficient.

### III. DESCRIPTION OF AFFECTED ENVIRONMENT

#### Flora

The project area contains three different natural forest communities, two of which are considered rare. Ohia/Olapa Montane Wet Forest, Mixed Grass and Sedge Montane Bog, and Ohia Mixed Montane Bog. The flat topography in this area, together with high rainfall (>150 inches/year) and poor soil drainage have created unique conditions in which bogs were able to develop. Typical Hawaiian bogs contain vegetation of low stature (< 1 meter) growing from a thick layer of peat above an impervious clay subsoil. The peat generally remains saturated with water, drowning the root systems of trees, and creating an environment in which only plants adapted to bog conditions can survive.

The Mixed Grass and Sedge Montane Bog community occupies approximately 20 acres within the project area. It is dominated by Sphagnum moss and the native sedge kuolohia (*Rhynchospora chinensis*). Other native species include the grasses, Isachne distictophylla, Dicanthelium cynodon and D. hillebrandianum. Native woody plants, including Ohia (*Metrosideros polymorpha*), ohelo (*Vaccinium* spp.) and pukiawe (*Styphelia tameiameia*) are present; but stunted to a height of 20cm or less. This bog type is known from a total of five sites on Maui and Hawaii. The association of grasses and sedges within this particular bog are unique to this one site.

The Ohia Mixed Montane Bog community occupies approximately 30 acres adjacent to the Mixed Grass and Sedge Bog. Vegetation is similar to that within the Mixed Grass and Sedge Bog, but slightly better drainage has allowed the Ohia to reach heights of up to 1 meter, and the development of a shrub layer. Other native species present include uki (*Machaerina angustifolia*), kamahehewa (*Labordia hedyosmifolia*), and the violet *Viola maviensis*. This bog type is known from fewer than 10 sites on the main Hawaiian Islands. As with the Mixed Grass and Sedge Bog, the particular association of species found within this bog is unique to this location.

Ohia/Olapa Montane Wet Forest surrounds the bogs in this area. This forest type is common within the Pu'u O Umi NAR and elsewhere in Hawaii. This community is dominated by Ohia and Olapa (*Cheirodendron trigynum*) trees up to 5m tall, with a variety of associated native trees, shrubs, ferns and mosses.

Feral pigs are present in high numbers in and around the project area. Their activity has contributed to the destruction of native vegetation and subsequent invasion by non-native weeds in much of the area surrounding the bog. Large areas have been converted from native shrubland into meadows of alien pasture grasses. Some of these non-native plants, especially *Tibouchina herbacea* and Palm Grass (*Setaria palmaefolia*) have the potential to spread further and completely displace native species. The bog areas are relatively free of weeds at present, primarily because the soft ground dissuades pigs from entering the bog. However, several animal trails have been established in portions of the bog, and weeds are colonizing these areas.

Botanical inventories of the project area were made in 1989 and 1995. Plant species observed are listed in Appendix B. 31 species of ferns and club mosses were found, 29 of which are native. 95 seed-bearing plants were identified, 46 of which were native. Appendix C lists rare or uncommon plants present in the area, and details their legal protected status, if any. The corridor from which vegetation is to be cleared prior to fence construction was surveyed in January 1997. No rare or endangered plants were observed within the area to be cleared.

#### Fauna

Animal life in the area consists of native and non-native bird species, invertebrates such as snails and insects, and both large and small mammals such as feral pigs, mongooses, rats, and cats. Common native forest birds found in the area include 'elepaio, 'amakahi, 'i'iwi, and 'apapane. A complete listing of the endangered and more common forest bird species found in the area is in Appendix D.

#### Sensitive Habitats

Given the information presented above in the Flora and Fauna sections, the entire project area can be considered as sensitive habitat, particularly with regard to rare or uncommon plants that occur within the bog. The

long-term goal of this project is protection of the intact native ecosystems in perpetuity. While construction of the fence line will entail a certain level of ground and noise disturbance, the long-term benefits of complete removal of all feral pigs, which is impossible without fencing to restrict animal movement, far outweighs the limited effects of fence construction within the six foot corridor.

#### Socio-Economic Impacts

The project is located within a public hunting area. However, the small size of the area to be enclosed makes it very unlikely that it will have any effect on present hunting opportunities. In addition, the project area is located in a remote area (3 hours one way hiking time from the nearest public access), and hunters rarely visit the site. Game animal populations (and hunting opportunities) outside the fenced area will not be affected by this project.

This project has been discussed with the Kohala Forest Management Group (KFMG), a regionally based group of individuals representing a variety of forest resource management and use interest, including hunters, environmentalists, community associations, government agency land managers and researchers, cultural practitioners and landowners. The KFMG gave its support to the project at an October 21, 1996 meeting.

#### **IV. ENVIRONMENTAL IMPACTS**

##### Short-Term Impacts

In the short-term, clearing a path to install the fence line will cause obvious disturbance to plants in a narrow corridor. As much as possible, the fence will be located in areas that have already been heavily disturbed by pigs, and in which the native vegetation has already been degraded. The large size of the enclosure (120 acres to protect a 50 acre bog) is necessary to avoid damage to the fragile soils and vegetation around the bog margins. Most of the fence will be built across a grassy field; where it passes through the forest, care will be taken to avoid cutting large trees. All rare plants will be clearly marked and pointed out to the crew performing the work to ensure they are not harmed in any way. Soil disturbance is expected to be minimal, and no changes in normal rainwater runoff or percolation are expected. No adverse effects on avifauna and invertebrate fauna are anticipated. This short-term impact will be far outweighed by the positive long-term benefits to be discussed below.

##### Long-Term Impacts

This fencing project, while having the short-term impacts described above, will reap long-term benefits by allowing for more efficient and effective control of feral ungulates. The long-term impacts of the fence construction itself can include introduction of non-native weed seeds along the fence corridor because personnel will be traversing the site regularly, and pooling or congregating of feral pigs as they walk along the outside of the fenced area.

It has been well documented that feral pigs can cause catastrophic damage to Hawaiian bog ecosystems. Excluding pigs from this area as soon as possible is necessary to ensure that the native plant communities remain intact. Long term protective management of this area should result in the reestablishment of native vegetation in portions of the bog already damaged by pigs. Many of the rare plants found in the area are highly susceptible to pig trampling and feeding; installing a fence will provide a sanctuary in which their numbers could increase, either through natural dispersal or outplanting.

#### **V. MITIGATION MEASURES**

The short-term effects identified above are unavoidable. Prior to clearing the line, any endangered or rare plant species will be marked and identified to the crew and crew leader to ensure their protection. No trees of greater than 6 inches basal diameter will be removed, and other plants disturbed will be replanted off the line if possible. As noted in Section IV, the fence will be placed along ridges and game trails in areas that have already been degraded by pig activity; existing vegetation in these areas is primarily non-native. If indication of the existence of archaeological sites or ruins are found, work on the project will halt immediately and the proper authorities notified.

Long term mitigation would include the following actions. Routine inspections to ensure the integrity of the fence and prevent the establishment of new weed species: if weeds not already widespread in the area are detected, they will be either removed immediately or a weed control effort will be organized. In addition, some of the non-native plant species already established within the project area have the potential to invade the bog area. Once the fence is completed, weed control methods that may include hand pulling or herbicide application may be developed to prevent further spread. If large numbers of pigs appear to be congregating around the fence and causing an increased level of damage, hunters from the Waimea area will be notified and given the opportunity to participate in a control effort.

## VI. ALTERNATIVES CONSIDERED

Four alternatives have been identified and are discussed here.

### Alternative 1. Build a 120 acre enclosure around the bog.

Follow through with the project as described above and install approximately 1½ mile of new fence to surround the bog. Remove pigs from the fenced area by driving them with a helicopter or hunting if necessary. This is the preferred alternative.

### Alternative 2. Build a larger enclosure, incorporating an existing fenceline on one side.

This alternative calls for constructing a much longer fence (5 to 6 miles) to completely surround the plateau on which the bog is located. The area enclosed would be roughly 600 acres. This would incorporate an existing fenceline located west of the bogs. This fence was constructed in the early 1990's across one side of the plateau in the hope that the cliffs at the back of Waipi'o and Waimanu valleys would be natural barriers too steep for pigs. Unfortunately, this was not the case.

While this action would accomplish the same result as the preferred alternative, and would allow the existing fence to serve its original purpose, it is not feasible for several reasons.

- 1) Expense. This would require a fence 4 times as long, and a greater effort, as the new fence would have to be built on steep terrain, crossing several deep gulches. Approximately ¼ of this fence has already been built, but installing the remainder would still cost more than the smaller unit.
- 2) Feasibility. Building a fence impervious to pigs around the entire plateau may not be possible. The lower portion of the plateau is dissected by several deep gulches. Waterfalls and cliffs could be incorporated into the fenceline to act as natural barriers, but pigs are likely to find a way in eventually. In addition, removing every pig from an area this size would require a large scale hunting effort, rather than a simple game drive.
- 3) Value. This portion of the Natural Area Reserve has been highly degraded by pig activity and non-native weeds. While remnants of the original vegetation and some rare plants exist here, there are other places in the NAR that merit protection more than this area. The small bog is the only feature in this area that is worthy of management.

### Alternative 3. Control pigs with other methods.

Pig numbers could be reduced in the vicinity of the bog with a variety of methods, including aerial shooting, snaring, flying in the public for special hunts, etc. This control effort would become an endless battle, as pigs would continue to reproduce or wander in from outside the control area. The possibility would still remain for animals to enter the bog itself. In the long term, increasing human activity in the bog to hunt or set snares would be just as destructive as pigs.

### Alternative 4. No Action

This alternative effectively accepts the deterioration of this unique resource by allowing feral animals to remain. While public hunting occurs in the area, without physical barriers to limit the movement of these destructive animals; it is not adequate, and never will be effective in keeping feral animal numbers low enough to



allow these native natural communities to remain viable.

**VII. DETERMINATION**

No significant negative impacts to the environment are expected as a result of this project.

**VIII. FINDINGS, AND REASONS SUPPORTING THE DETERMINATION**

The intent of this project is to benefit native species in the project area. Creating a permanent barrier to exclude pigs from these fragile plant communities will remove the primary threat to their continued survival. Ample evidence exists to show that damage caused by feral pigs can lead to the eventual replacement of unique Hawaiian vegetation by introduced weeds. If pigs are removed before disturbance becomes too severe, native vegetation is able to recover naturally and the spread of weeds slowed or even reversed.

The risk of significant negative impact is low. Most of the area to be crossed by the fence has already been disturbed by pigs; vegetation in these areas is primarily non-native. The fragile bog will not be disturbed by fence construction. No rare or endangered plants were seen within the area to be cleared for fence construction.

The possibility for introduction of new weed species as a result of human activity exists. This can be minimized by ensuring that tools and construction material flown to the site are clean. After fence construction is completed, regularly scheduled inspection and weed control trips will be made to prevent further spread of noxious plants within the project area.

**IX. EA PREPARATION INFORMATION**

This Environmental Assessment was prepared by:

Bryon Stevens  
Natural Area Specialist  
DLNR, Division of Forestry and Wildlife  
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P.O. Box 4849  
Hilo, HI 96720-0849

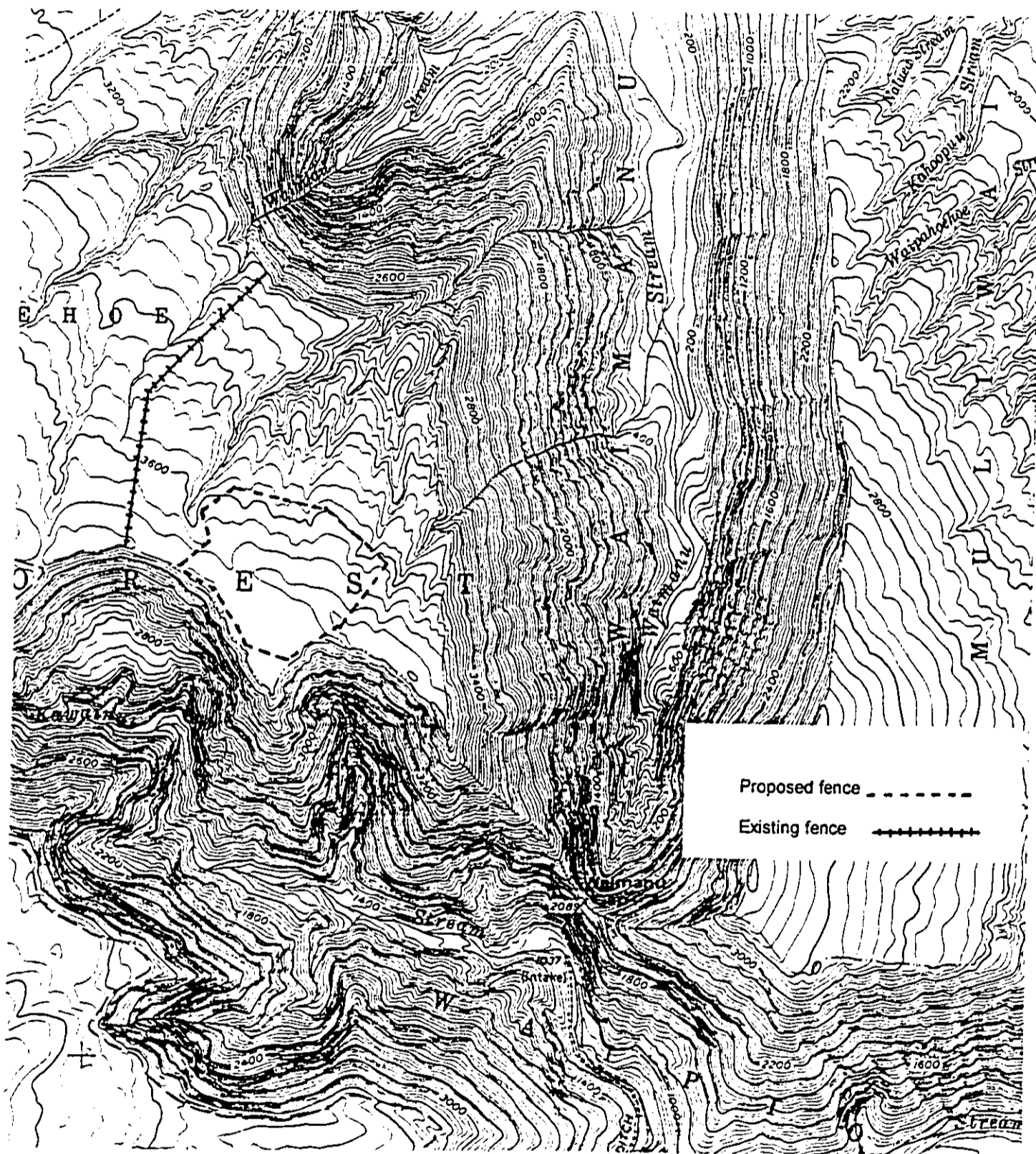
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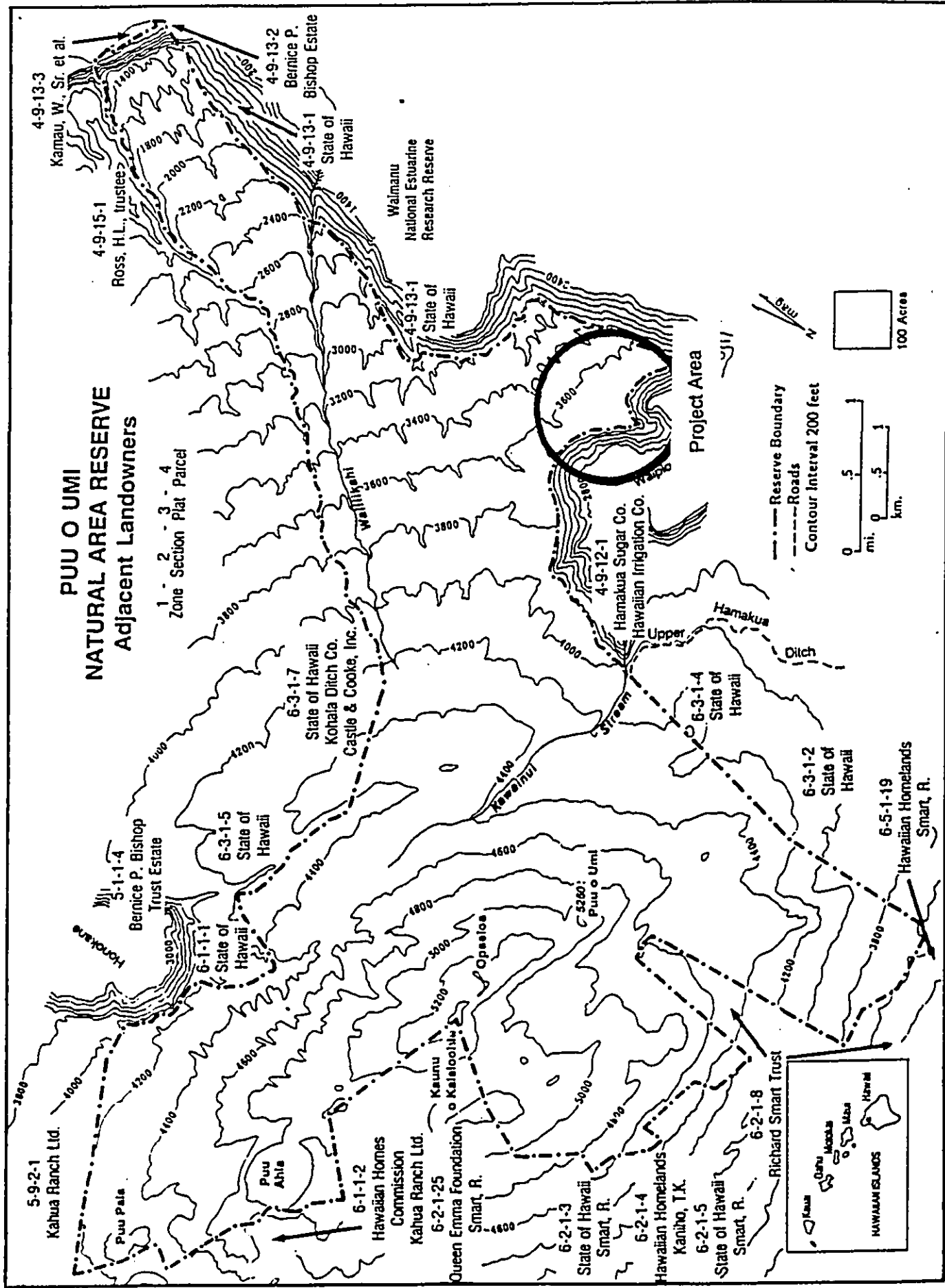
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**X. LIST OF APPENDICES**

Appendix A	Maps of Project Area
Appendix B	Project Area Plant Inventory
Appendix C	Rare Plant Species Found in or near the Project Area
Appendix D	Native and Introduced Bird Species of the Puu O Umi NAR.
Appendix E	Comments received regarding Draft Environmental Assessment

Appendix A  
Maps of Project Area





Appendix B  
Project Area Plant Inventory

Ferns and Clubmosses			Monocotyledonous plants		
Taxon		status	Taxon		status
Asplenium	contiguum	E	Astelia	menziesiana	E
	polyodon	I	Axonopus	fisifolius	X
	unilaterale	I	Carex	alligata	E
Cibotium	menziesii	E	Commelina	diffusa	X
	glaucum	E	Cyperus	halpan	X
Deparia	petersenii	X	Deschampsia	nubigena	E*
Dicranopteris	linearis	I	Dicanthelium	cynodon	E*
Diplopterigium	pinnatum	E		hillebrandianum	E*
Dryopteris	glabra	E	Digitaria	ciliatum	X
Elaphoglossum	alatum	I	Erharta	stipoides	X
	hirtum	I	Eleocharis	obtusa	I
Grammitis	hookeri	E	Freycinetia	aborescens	E
	tenella	E	Holcus	lanatus	X
Lycopodium	cernuum	I	Isachne	distychophylla	E
	venustum	I	Juncus	effusus	X
Mecodium	recurvum	E		ensifolius	X
Microlepia	strigosa	I		planifolius	X
Odontosoria	chinensis	I		tenuis	X
Ophioglossum	pendulum	I	Kyllinga	breviflora	X
Psilotum	complanatum	I	Liparis	hawaiensis	E*
Pteris	cretica	I	Paspalum	conjugatum	X
Sadleria	cyathoides	E		urvillei	X
Sphaeronconium	lanceolatum	E	Poa	annua	X
Sticherus	owhyensis	E	Pycreus	polystachyos	I
Thelypteris	dentata	X	Rhynchospora	chinensis	E
Vandenboschia	davalliodes	E	Sacciolepis	indica	X
Xiphopteris	saffordii	E	Sporobolus	indicus	X
Adenophorus	hymenophylloides	E	Rhynchospora	caduca	X
	pinnatifidus	E	Pritchardia	lanigera	E*
	tamariscinus	E	Machaerina	angustifolia	E
Sadleria	pallida	E	Setaria	palmaefolia	X
			Smilax	melastomifolia	E
			Andropogon	virginicus	X
			Hedychium	gardenarianum	X

**Key to Plant Status**

- E\* Rare endemic plant species (see Appendix C).
- E Plant species endemic to Hawai'i.
- I Plant species indigenous to Hawai'i.
- X Non-native, introduced by humans.

**Botanical Inventory Source Information:**

Pu'u O Umi Natural Area Reserve Resource Information, prepared by The Nature Conservancy of Hawaii, Hawaii Heritage Program, 1989.

Hawai'i Branch NARS field surveys, 1995-6.

Dicotyledonous plants

Taxon		status	Taxon		status
Alyxia	olivaeformis	E	Taraxacum	officinale	X
Broussasia	arguta	E	Tibouchina	herbacea	X
Cardamine	flexuosa	X	Trematolobelia	grandifolia	E
Centella	asiatica	X	Trifolium	repens	X
Cheirodendron	trigynum	E	Vaccinium	calycinum	E
Coprosma	pubens	E		dentatum	E
Crassocephalum	crepidoides	X	Verbena	littoralis	X
Cuphea	carthagenensis	X	Veronica	plebia	X
Clermontia	kohalae	E		serpyllifolia	X
Cyrtandra	paludosa	E	Viola	maviensis	E
Drymaria	cordata	X	Youngia	japonica	X
Dubautia	plantaginea	E			
Epilobium	billardierianum	X			
	ciliatum	X			
Erechtites	valerianifolia	X			
Geranium	hormemanum	X			
Hedyotis	terminalis	E			
	hillebrandii	E			
Hydrocotyle	verticillata	X			
Hypericum	mutilum	X			
Hypochaeris	radicata	X			
Ilex	anomala	X			
Korthaselia	cylindrica	E			
Labordia	hedyosmifolia	E			
Lobelia	hypoleuca	E			
Ludwigia	palustris	X			
Melastoma	candidum	X			
Melicope	clusiifolia	E			
Metrosideros	polymorpha	E			
Myrsine	lessertiana	E			
	sandwichensis	E			
Nertera	granadensis	E			
Oxalis	comiculata	X			
Peperomia	hypoleuca	E			
	membranacea	E			
Pilea	peploides	E			
Pipturus	albidus	E			
Pittosporum	hawaiiensis	E			
Plantago	major	X			
Pluchea	symphytifolia	X			
Polygonum	punctatum	X			
Psychotria	hawaiiensis	E			
Rubus	rosifolius	X			
Rumex	acetosella	X			
	crispus	X			
Sonchus	oleraceus	X			
Stenogyne	calaminthoides	E			
	cranwelliae	E			
Styphelia	tameiameiae	E			

Appendix C  
Rare Plant Species in or near the Project Area

Taxon	Notes
Dicanthelium cynodon and Dicanthelium hillebrandianum	Dicanthelium is a tussock or mat forming grass found in bogs on all the main Hawaiian islands. While it is not legally protected, the habitat in which it occurs is rare and restricted to small areas.
Liparis hawaiiensis	Liparis is a native orchid found in wet forests and bogs on all the main islands. It is sensitive to pig disturbance and is uncommon within the Pu'u O Umi NAR. It is not legally protected.
Pritchardia lanigera	P. lanigera is a palm found in wet forests of the Kohala Mountains and Windward Mauna Kea. Fewer than 500 plants within the Kohala Mountains. This plant is listed as a "Species of Concern" by the U. S. Fish and Wildlife Service. It may merit protected status, but further study is required.
Lobelia hypoleuca	Lobeliad occurring in wet forests on 6 islands. Federal Species of Concern.
Stenogyne cranwelliae	Native mint, restricted to the Kohala Mountains. Federal Species of Concern.
Trematolobelia grandifolia	Lobeliad restricted to wet forests of the Big island. Federal Species of Concern.
Viola maviensis	Native violet restricted to bogs and bog margins, Moloka'i, Maui and Hawai'i. Uncommon in the Kohala Mountains.

Appendix D  
Native and Introduced Bird Species of the Pu'u O Umi NAR

Taken from Pu'u O Umi Natural Area Reserve, Resource Information, prepared by The Nature Conservancy of Hawaii, Hawaii Heritage Program, 1989.

The birds listed have been reported from visual and audio identification in or near the Reserve. The list includes information on rare birds, compiled from the literature. Taxonomy follows the Checklist of the Birds of Hawaii by R. Pyle (1988).

Status	Species	Common Name	Source
+E	<u>Anas wyvilliana</u>	Koloa, Hawaiian Duck	x
+E	<u>Buteo solitarius</u>	Io, Hawaiian Hawk	x
N	<u>Cardinalis cardinalis</u>	Northern Cardinal	*
N	<u>Carpodacus mexicanus</u>	House Finch	x
E	<u>Chasiempis sandwichensis</u>	Elepaio	*
	<u>sandwichensis</u>		
N	<u>Garrulax canorus</u>	Hwamei	*
E	<u>Hemignathus virens virens</u>	Amakihi	*
E	<u>Himatione sanguinea</u>	Apapane	*
	<u>sanguinea</u>		
N	<u>Leiothrix lutea</u>	Red-billed Leiothrix	x
N	<u>Lonchura punctulata</u>	Nutmeg Mannikin	x
N	<u>Phasianus colchicus</u>	Ring-necked Pheasant	x
+E	<u>Puffinus newelli</u>	A'o, Newell Shearwater	x
N	<u>Streptopelia chinensis</u>	Spotted Dove	x
E	<u>Vestiaria coccinea</u>	I'iwi	*
N	<u>Zosterops japonicus</u>	Japanese White-eye	*

+ = Rare

N = Non-native

E = Endemic

\* = Confirmed in NARS field study

x = Cited in literature sources

BENJAMIN J. CAYETANO  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
STATE HISTORIC PRESERVATION DIVISION  
33 SOUTH KING STREET, 8TH FLOOR  
HONOLULU, HAWAII 96813

December 12, 1996

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

DEPUTY  
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT  
PROGRAM

AQUATIC RESOURCES  
CONSERVATION AND

ENVIRONMENTAL AFFAIRS  
CONSERVATION AND  
RESOURCES ENFORCEMENT

CONVEYANCES  
FORESTRY AND WILDLIFE

HISTORIC PRESERVATION  
DIVISION

LAND MANAGEMENT


STATE PARKS

WATER AND LAND DEVELOPMENT

MEMORANDUM

LOG NO: 18616 ✓  
DOC NO: 9612PM14

TO: William T. Stormont, Natural Area Specialist  
Natural Area Reserves System Commission

FROM: Don Hibbard, Administrator and  
Deputy State Historic Preservation Office 

SUBJECT: Fencing a Section of Puu o Umi Natural Area Reserve  
Hamakua District, Hawaii Island

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This is in response to your letter of December 3, 1996, requesting a review of the proposed fencing project. We have no record of historic sites in the area that will be fenced and it is unlikely that any exist because of the location and environment, which is forest and bog situated at approximately 3750 feet above sea level. We thus believe that the proposed project will have "no effect" on significant historic sites. If human remains or other indications of human activity older than 50 years should be found during the vegetation clearing and installation of the fence our office should be contacted immediately and work stopped until one of our staff members has had an opportunity to inspect the finds. Should this happen please contact either Marc Smith in Hilo (933-4346) or Patrick McCoy in Honolulu (587-0006).

PM:jk





**United States Department of the Interior**

**U.S. GEOLOGICAL SURVEY**

**PACIFIC ISLAND ECOSYSTEMS RESEARCH CENTER**

**Hawaii Field Station**

**P.O. Box 44**

**Hawaii National Park, HI 96718**

**Phone: (808) 967-7396 FAX: (808) 967-8568**

December 16, 1996

William T. Stormont  
State of Hawai`i  
Department of Land and Natural Resources  
Division of Forestry and Wildlife  
P.O. Box 4849  
Hilo, HI 96720

Dear Bill,

Thanks for the opportunity to review your draft Environmental Assessment for the fence construction around the 120 acre area in the Puu O Umi NAR. I think you and Bryon have done a good job of identifying the need for this action, and proposing a project that will be effective in protecting this important biological area. As identified in this document, there are other important biological diversity areas within the Puu O Umi NAR that need similar protection. I hope this project will be the first step in getting management of important areas with unique natural resources in the Kohala Mountains started again. I am particularly pleased that you have been able to get this project endorsed by the Kohala Forest Management Group.

I have noted a few minor comments on the enclosed copy of your draft. However, it appears that this document is already in pretty good shape for formal review.

Please call if you need any additional information or clarification of my comments.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jim".

James D. Jacobi

Enclos. (1)

BENJAMIN J. CAYETANO  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF LAND MANAGEMENT  
P.O. BOX 938  
HILO, HAWAII 96721-0938

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

December 13, 1996

MEMORANDUM

TO: Mr. William T. Stormont, Natural Area Specialist  
Hawaii Division of Forestry and Wildlife

FROM: Philip Ohta, District Land Agent  
Hawaii District Land Office

SUBJECT: Draft Environmental Assessment for Fence Installation in  
the Puu O Umi Natural Area Reserve, Hamakua, Hawaii.

The Hawaii District Land Office has reviewed the draft environmental assessment for the proposed fence installation to protect a section of high quality native ecosystem in the Puu O Umi Natural Area Reserve located at Hamakua, Hawaii, and has no objections to the related matter, but would suggest that a copy of the subject assessment be forwarded to the Land Division's Planning Branch (formerly Office of Conservation and Environmental Affairs) in Honolulu for their input since the reserve area is in the Conservation District.

Should you have any questions relating to this matter, please contact this office at 974-6203.

cc: Mr. D. Y. Uchida  
Hawaii Land Board Member



IN REPLY REFER TO:

## United States Department of the Interior

### NATIONAL PARK SERVICE

Hawaii Volcanoes National Park

P.O. Box 52

Hawaii 96718-0052

December 13, 1996

Mr. William Stormont, Natural Area Specialist  
Division of Forestry and Wildlife  
P.O. Box 4849  
Hilo, Hawai'i 96720

Dear Bill:

I have reviewed the Environmental Assessment prepared by Bryon Stevens on proposed fencing in Pu'u O Umi Natural Area Reserve. The EA appears to be factual and accurately researched, and I support the preferred alternative. The effectiveness of feral pig control in preventing weed invasions and in stimulating recovery of native plants is well documented for bogs on Maui by Loope, Gagne, and Medeiros in CPSU Technical Reports 76-78. I agree with your strategy of first protecting the most intact, manageable, and biologically diverse or unique areas. We have found that this Special Ecological Area approach to be a productive strategy at Hawai'i Volcanoes National Park. I hope that this 125 acre enclosure will be the first increment in the protection of additional areas in Pu'u O Umi Natural Area Reserve and other NARS. Finally, I find it encouraging that there is "buy in" from hunting groups. I know that it takes a great deal of patience and time to get consensus, and I hope this is a good sign for achieving consensus in the upper Puna-Volcano area.

Sincerely,

Jim Martin  
Superintendent



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 AUPUNI STREET • HILO, HAWAII 96720  
TELEPHONE (808) 969-1421 • FAX (808) 969-6996

December 26, 1996

Mr. William T. Stormont  
Natural Area Specialist  
State of Hawaii  
Department of Land and Natural Resources  
Division of Forestry and Wildlife  
P.O. Box 4849  
Hilo, HI 96720

DRAFT ENVIRONMENTAL ASSESSMENT  
FENCE CONSTRUCTION AT PU'U O UMI NATURAL AREA RESERVE

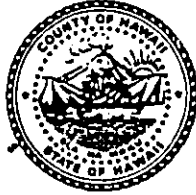
The Department has reviewed the subject matter and has no comment at this time.

Milton D. Pavao, P.E.  
Manager

DL:dms

*... Water brings progress...*

Stephen K. Yamashiro  
Mayor



Virginia Goldstein  
Director

Norman Olesen  
Deputy Director

## County of Hawaii

### PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252  
(808) 961-8288 • Fax (808) 961-9615

December 19, 1996

Mr. William T. Stormont  
Division of Forestry and Wildlife  
Department of Land and Natural Resources  
P.O. Box 4849  
Hilo, HI 96720

Dear Mr. Stormont:


Draft Environmental Assessment for Fence Construction around  
BOG Unit, Pu'u O Umi Natural Area Reserve  
TMK: 4-9-13: Portion of 1; Laupahoehoe 1st, Hamakua, Hawaii

Thank you for your letter dated December 3, 1996, transmitting a copy of the above-described draft environmental assessment for our review and comment.

We have only one comment to offer. The project site is situated within the County's Special Management Area (SMA). Therefore, all improvements must be subject to review by this office against state and county SMA regulations (Chapter 205A, Hawaii Revised Statutes and Planning Commission Rule No. 9). We are enclosing an SMA Use Permit Assessment Application which, when completed and submitted, will allow our office to conduct a thorough assessment of the proposal against our SMA requirements.

Thank you for giving our office the opportunity to comment. Should you have any questions, please contact Daryn Arai of my staff at 961-8288.

Sincerely,

  
VIRGINIA GOLDSTEIN  
Planning Director

DSA:cmr  
F:\WPWIN60\DSA\LSTORM01.DSA  
Enclosure

BENJAMIN J. CAYetano  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
KENDALL BUILDING  
822 MILILANI STREET, SUITE 700  
HONOLULU, HAWAII 96813  
NATURAL AREA RESERVES SYSTEM COMMISSION

December 17, 1996

TO: Bill Stormont, NARS Specialist

FROM: Betsy Gagné, NARS Executive Secretary

RE: Pu'u O 'Umi Natural Area Reserve Fence Draft Environmental Assessment

My compliments to Bryon Stevens for a nice piece of work; not to mention all your efforts with the working groups and others. One issue that no one seems to agree on is use of diacritical marks (glottal stops) on locale and plant names. There should be some consistency: either have em or not, not just some here and there. 'Umi does have one, as Debbie Chang and other Hawaiians pointed out to me earlier.

Presume you will be submitting this to OEQC. Thank you for giving me the opportunity to comment. If individual commissioners wish to review and comment, I will circulate copies to them. Otherwise, I will keep them apprised that you are going through this process.

This last paragraph is added this afternoon (December 18). In addition to naming the bog communities, you may want to refer to their global ranking (TNC) which underscores that they are unique in all the world. That will fall on certain deaf ears, but may get through to some of the "double recessives". Also, on placement of the fence along game trails, clearly indicate that it will not block hunter trails per se. On Kaua'i there have been problems with just such language. Naturally not everyone can be satisfied at the same time, just a thought/suggestion from past experience on Maui as well.

Good job Bryon!!!