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GOVERNOR OF HAWAII



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

September 25, 1996

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OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

Mr. Gary Gill, Director  
Office of Environmental Quality Control  
220 South King Street, 4th Flr.  
Honolulu, HI 96813

Dear Mr. Gill:

**SUBJECT:** Final Environmental Assessment and Finding of No Significant Impact (FONSI) for a Fence Project to Protect the East Maui Watershed; TMK: 1-1-02-2, 2-3-05-1, 2-3-05-4, and 2-4-16-4, Districts of Hana and Makawao, County of Maui, State of Hawaii

The Department of Land and Natural Resources has reviewed and responded to the comments received during the 30-day public comment period which began on August 8, 1996. 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 October 8, 1996 Environmental Notice.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA. Please contact Betsy Gagne at 587-0063 if you have any questions.

Sincerely,

*for* *Carl J. Masahie*  
MICHAEL G. BUCK  
Administrator

Enclosures

125

1996-10-08-MA-FEA - Fence Project to Protect the  
East Maui Watershed

OCT 8 1996

**FILE COPY**

FINAL ENVIRONMENTAL ASSESSMENT FOR A  
FENCE PROJECT TO PROTECT THE  
EAST MAUI WATERSHED

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This document prepared pursuant to Chapter 343, HRS

Proposed by the:

**EAST MAUI WATERSHED PARTNERSHIP**

State Division of Forestry and Wildlife  
The Nature Conservancy of Hawai'i  
National Park Service  
East Maui Irrigation Company, Ltd.  
Maui County  
Haleakala Ranch Co.  
Keola Hana Maui, Inc.

September 1996

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## **I. Summary**

### ***Project Name***

A Fence Project to Protect the East Maui Watershed

### ***Proposing Agency / Applicant***

State Department of Land and Natural Resources  
Division of Forestry and Wildlife

The Nature Conservancy of Hawai'i

U.S. Department of Interior  
National Park Service

East Maui Irrigation Company, Ltd.

Maui County

Haleakala Ranch Co.

Keola Hana Maui, Inc.

### ***Approving Agency***

State Department of Land and Natural Resources  
Division of Forestry and Wildlife

### ***Project Location***

9,788 acres in the Districts of Hāna and Makawao, County of Maui, State of Hawai'i

<u>Tax Map Key</u>	<u>Acres</u>
2-3-05-1	19
2-3-05-4	3,478
1-1-02-2	3,744
2-4-16-4	<u>2,547</u>
	9,788

## **Agencies and Individuals Consulted During EA Preparation**

### **Federal**

Environmental Protection Agency  
Office of Senator Inouye  
Office of Senator Akaka  
Office of Representative Abercrombie  
Office of Representative Mink  
US Army Corps of Engineers  
US Department of Agriculture/Animal Damage Control  
US Department of Agriculture/Forest Service  
US Department of Agriculture/Natural Resources Conservation Service, Maui District  
US Department of Interior/Fish & Wildlife Service  
US Department of Interior/National Biological Service  
US Department of Interior/National Park Service/Haleakalā National Park

### **State**

Aquatic and Wildlife Advisory Committee, Maui  
Department of Agriculture  
Department of Hawaiian Home Lands  
DLNR/Aquatic Resources Division, Maui District  
DLNR/ Division of Forestry & Wildlife, Maui District  
DLNR/ Division of Land Management, Maui District  
DLNR/ State Historic Preservation Division  
Office of Conservation and Environmental Affairs  
Office of Hawaiian Affairs  
Office of State Planning  
Representative Chris Halford  
Representative David Morihara  
Representative Joseph Souki  
Representative Billy Swain  
Representative Michael White  
Senator Roz Baker  
Senator Avery Chumbley  
Senator Joe Tanaka  
University of Hawai'i, Environmental Center  
University of Hawai'i, Secretariat for Conservation Biology

### **Maui County**

County Council  
Department of Economic Development  
Department of Public Works  
Department of Water Supply  
Mayor Linda Lingle  
Planning Department, Maui County

## Private

Alu Like, Inc.  
Amfac/JMB Hawaii  
Alexander & Baldwin, Inc.  
Darrell Aquino  
Nelson Akiu  
Peter D. Baldwin  
Anne Brasher  
Zadoc W. Brown, Jr.  
Awapuhi Carmichael  
Center for Plant Conservation (HI flora)  
Doug Chong  
Conservation Council for Hawai'i  
Joseph J. Day  
Ellen P. Denecke  
East Maui Irrigation Co.  
Sumner Erdman  
Mary Evanson  
Haiku Community Association  
Haleakala Ranch Company  
Isaac Hall & Dana Naone Hall  
Hāna Community Association  
James J.C. Haynes  
Hawaii Audubon Society  
Hawaiian Botanical Society  
Harry Hueu  
Humane Society of Hawaii  
Julliet K. Kaauamo  
Kawehi G. Kaauamo  
Mary Kaauamo  
Nalani & Frances Kaauamo

Sam Kaauamo, Jr.  
Sam Kaauamo, Sr.  
Solomon Kaauamo  
Henry H. Kaililau  
Mr. & Mrs. Isaac E. Kanoa, II  
Jerome & Puaala Kekiwi  
Keola Hana Maui, Inc.  
Pualani & Willie Kimokeo  
Living Indigenous Forest Ecosystems  
Makawao-Pukalani Community Association  
Maui Humane Society  
Maui Pineapple Company  
Maui Tomorrow  
Helen Nakanelua  
Nā Moku Aupuni O Ko'olau Hui  
Native Hawaiian Advisory Council  
Native Hawaiian Legal Corporation  
Native Hawaiian Plant Society  
Patricia Neal  
David Nobriga  
Eddie Oliveira  
Outdoor Circle  
Outdoor Circle, Maui  
Tau-a & Harry Pahukoa  
Sierra Club Legal Defense Fund  
Sierra Club/ Maui Group  
Lucille K. Smith  
Rene Sylva  
The Nature Conservancy, Maui Office  
The Wildlife Society, Hawai'i Chapter  
Ulupalakua Hunt Club, Inc.  
Upcountry Hunter & Sportsman Club  
Elaine Wender  
Edward Wendt

## **Project Action Summary**

The Division of Forestry and Wildlife (DOFAW), in a cooperative effort with the County of Maui, Haleakalā National Park, Haleakala Ranch, Keola Hana Maui, Inc., East Maui Irrigation Company, Ltd. (EMI), and The Nature Conservancy of Hawai'i, proposes construction of four fences on windward East Maui as part of an ongoing effort to protect the watershed. These fences, tied to existing fences and natural barriers such as sheer cliffs, will prevent animals from moving into the upper forest from the lower forests. The fencing will take place in two phases (see Figure 1). Currently funding is available only for Phase 1 sections: a 1.6-mile section along the 3,600-foot elevation contour across Ko'olau Gap, and a 0.7-mile fence in the Waikamoi / Honomanū area at approximately 3,700 feet. Phase 2 of the project includes two sections, one just east of Ko'olau Gap (approximately 3.6 miles long), and a connecting fence (approximately 1.6 miles long) along a portion of the western boundary of Hanawā Natural Area Reserve (NAR).

## II. Project Description

(For purposes of this project, the "East Maui watershed" includes the wet, windward slopes of Haleakalā volcano from the Hāna Highway to the mountain's summit.)

### *General*

The East Maui Watershed Partnership (EMWP) is a voluntary effort between six public and private landowners and the County of Maui who are working together to protect the 100,000-acre core of this critical watershed. (The project area for this environmental assessment covers 9,788 acres of the 100,000-acre core.) The Partnership's sole purpose is to ensure that this watershed remains a viable resource for this and future generations.

The East Maui watershed is the largest harvested source of surface water in Hawai'i, providing more than 60 billion gallons of water per year to meet residential, commercial, and agricultural needs in upcountry, East, and Central Maui, and stream water supporting farming and other uses throughout the windward coast. This area also comprises some of Hawai'i's richest remaining native rain forest, habitat for the world's greatest concentration of endangered birds, as well as several other plant and animal species found nowhere else on earth. Although portions of the watershed are actively protected (Hanawā NAR, Haleakalā National Park, and Waikamoi Preserve), over half of this forest continues to be degraded by feral pigs, introduced weeds, and other threats leading to species loss, accelerated erosion, and siltation of downstream and coastal waters. The area covered in native forest is shrinking, and destructive pest species threaten to accelerate the rate of forest loss.

The EMWP is taking several steps to protect the watershed against destructive weeds and other threats. Planning is now underway for improving the protection of the upland, most pristine regions of the watershed from damage by feral pigs. These are non-native, domestic pigs that have spread into the forest, where they have become the chief cause of forest destruction by rooting up plant cover, accelerating erosion and the spread of weeds, and aiding the spread of disease-carrying mosquitoes into the habitat of native birds. Earlier efforts by the National Park Service, The Nature Conservancy, and the state have demonstrated that pigs can be effectively removed from remote forests, and that these protected forests can recover from previous pig damage.

One of the Partnership's long-range goals is to stop pig damage in native forests and other habitats in the upland areas and to limit pig activity in lowland native forests to levels that prevent loss of forest cover. Removal of pigs from the upper area (see Figure 1) will be carried out by the staff of the partner organizations. Trained volunteers may also be involved in some aspects of this work. In the lower area, pig damage will be kept in check through increased public hunting. Fences are needed to prevent pigs from moving upslope into the more sensitive,

remote forests. These upper forests are the primary habitat for Haleakalā's endangered forest birds. The proposed fences are tall enough to stop pigs (about 40 inches tall), but are not intended to stop people from entering the upper forests. In each case, the proposed fence locations are very remote and isolated from areas used regularly by hunters. No existing trails are blocked by the proposed fences. Ladders or gates will be installed in the fences wherever needed to ensure appropriate human access.

Above the fences, trained forest managers from EMWP member organizations (especially Haleakalā National Park, The Nature Conservancy of Hawai'i, and the State Division of Forestry and Wildlife) will carry out pig removal. By utilizing experienced staff, the risks of damage to the more pristine upland forest and injury to volunteers will be reduced. In some cases, hunters and other trained volunteers may be utilized. (Community hunters have expressed interest in helping with animal eradication above the fences.) Pigs will be removed by the same combination of hunting and trapping methods that have proven effective in protected portions of the watershed. There are relatively few pigs in the upper forest area at this time, and the goal for this upper area is to keep pig numbers as close to zero as possible to minimize the number of animals that must be killed, and to protect the forest from all pig damage.

Below the fences, the State of Hawai'i and EMI plan to implement a new vehicular access agreement to improve access for public hunting utilizing roads owned and maintained by EMI, and to provide state game management supervision of the expanded hunting program. This public hunting area makes up over half of the forested watershed (over 50,000 acres). Licensed public hunters will be allowed to take pigs from the area on designated hunting days which are not in conflict with EMI's operations, and in accordance with state hunting regulations. The intention of the EMWP is to allow local hunters to continue to enjoy hunting in the area and to provide meat for home use, while keeping the lowland pig population in check and preventing pigs from moving into the more pristine uplands.

### **Location**

The project area covers 9,788 acres on the windward slopes of Haleakalā. The area we have defined includes part of the state-owned Ko'olau Forest Reserve, EMI property above the state forest reserve, and Waikamoi Preserve, an area that is owned by Haleakala Ranch Co. and managed by The Nature Conservancy of Hawai'i. All project lands are within the Conservation District.

Four proposed fence segments (see Figure 1), tied to existing fences and natural barriers such as sheer cliffs, will prevent animals from moving into the upper forest from the lower forests. The fencing will take place in two phases. Currently, funding is available only for Phase 1 sections: a 1.6-mile section along the 3,600-foot elevation contour across Ko'olau Gap, and a 0.7-mile fence in the Waikamoi / Honomanū area at approximately 3,700 feet. This funding comes from a 1995 state budget proviso (Act 218, SLH 1995, Part II, Section 26). An allocation of \$490,000 has been made for this project, which is one portion of a larger watershed protection project. Phase 2 of

the project includes two sections, one just east of Ko'olau Gap (approximately 3.6 miles long), and a connecting fence (approximately 1.6 miles long) along a portion of the western boundary of Hanawā NAR.

The Ko'olau Gap fence will be located on state land just below property owned by EMI, and the Waikamoi / Honomanū fence would be built on land owned by EMI. The Phase 2 fences will be located on state land.

In addition to the segments described above, the EMWP is planning to construct a 0.7-mile fence on the border of Waikamoi Preserve (Figure 1). Some scouting and clearing work has already begun in preparation for construction. While part of the funded project described here, this fence is already covered by an existing Environmental Assessment prepared for Waikamoi Preserve, and has already undergone public and agency review.

### III. Summary Description of the Affected Environment

#### *Native Flora and Fauna*

The project area is habitat for several endangered or threatened plants and animals (Appendix 1). In fact, the East Maui watershed as a whole is recognized as one of the most important conservation areas in the state (L.L. Loope and A.C. Medeiros. 1995. Strategies for long-term protection of biological diversity in rainforests of Haleakalā National Park and East Maui, Hawaii. *Endangered Species UPDATE*. 12[6]: 1-5.), largely because so much native habitat remains.

The vegetation in the area where the Ko'olau Gap fence will be built is a closed canopy, 'ōhi'a (*Metrosideros polymorpha*) / mixed shrub montane wet forest. Other common species include waimea (*Perrottetia sandwicensis*) and uluhe (*Dicranopteris*, *Sticherus*, and/or *Diplopterygium*). Hāpu'u tree ferns (*Cibotium*) are common, but not co-dominant. Vegetation near the proposed East Honomanū section is an open, wet 'ōhi'a forest with a sparse subcanopy of native shrubs, trees, and ferns, including hāpu'u tree ferns. The ground layer is dominated by alien grasses and sedges. The steeper gulch walls are dominated by native shrubs, trees, and ferns.

The phase 2 sections are known from helicopter overflights, and monitoring done along U.S. Fish and Wildlife Service Transect 6, which crosses near the midpoint of the section that extends northwest from Hanawā NAR to Ko'olau Gap. This area has been generally characterized as a wet 'ōhi'a forest with a native tree and tree fern subcanopy and a native shrub, vine, and mat fern understory (Jacobi, J.D. 1985. Vegetation Maps of the Upland Plant Communities on the Islands of Hawai'i, Maui, Moloka'i, and Lāna'i. Unpublished draft manuscript). The canopy varies from open to closed.

More detailed descriptions of the vegetation along the proposed fence routes are provided below.

### Phase 1, Waikamoi / Honomanū Section

This section has only been surveyed by air. It is a very open canopy wet 'ōhi'a (*Metrosideros polymorpha*) forest with a sparse subcanopy of native shrubs, trees, ferns, and hāpu'u (*Cibotium* sp.). The ground layer is dominated by alien grasses and sedges. The steeper gulch walls are dominated by native shrubs, trees, and ferns.

### Phase 1, Ko'olau Gap Section

This section has been surveyed from the air several times, and an approximate fence route has been surveyed on the ground. It is a closed canopy 'ōhi'a/mixed shrub montane wet forest. Other common species include waimea (*Perrottetia sandwicensis*), uluhe, kāwa'u (*Ilex anomala*), kōlea (*Myrsine lessertiana*), and alani (*Melicope clusifolia*). Trees are thickly covered with native bryophytes and epiphytes. The more common species of the dense, closed understory include pilo (*Coprosma* spp.), pūkiawe (*Styphelia tameiameia*), 'ōhelo (*Vaccinium* sp.), māmaki (*Pipturus albidus*), kanawao (*Broussaisia arguta*), na'ena'e (*Dubautia scabra*), manono (*Hedyotis* spp.), 'ape'ape (*Gunnera petaloidea*), 'ōhā wai nui (*Clermontia arborescens*), naupaka kuahiwi (*Scaevola chamissoniana*), and 'ākala (*Rubus hawaiiensis*). Native ferns include 'ama'u (*Sadleria* spp.), 'ae (*Polypodium pellucidum*), *Dryopteris wallichiana*, 'ākolea (*Athyrium microphyllum*), *Pteris excelsa*, *Pteris cretica*, *Athyrium sandwichianum*, and *Pneumopteris sandwicensis*. Other ground cover species include *Carex alligata*, *Uncinia uncinata*, *Machaerina angustifolia*, pa'iniu (*Astelia menziesiana*), *Luzula hawaiiensis*, 'ala'ala wai nui (*Peperomia* spp.), *Stenogyne kamehamehae*, *Rubus macraei*, and *Elaphoglossum* spp. Hāpu'u are common, but not co-dominant. At least two individuals each of makou (*Ranunculus* sp.) and 'ohe'ohe (*Tetraplasandra kawaiiensis*) were seen on the ground survey.

### Phase 2, Hanawī Sections

These sections are known from helicopter overflights, and monitoring done on U.S. Fish and Wildlife Service Transect 6, which crosses near the midpoint of the section that extends northwest from Hanawī NAR to Ko'olau Gap. This area contains wet 'ōhi'a (*Metrosideros polymorpha*) forest with native tree and tree fern subcanopy and a native shrub, vine, and mat fern understory (Jacobi, J.D. op. cit.). It varies from open to closed canopy. Aerial views indicate few weeds in a mosaic of native natural communities that include 'ōhi'a/uluhe (*Metrosideros polymorpha*/*Dicranopteris* sp., *Sticherus* sp., and *Diploterigium* sp.) montane wet forest, uluhe lowland wet shrubland, 'ōhi'a/mixed shrub montane wet forest, and 'ōhi'a/'ōlapa (*Cheirodendron*) montane wet forest. Other common species in all these community types include those mentioned above for the Ko'olau Gap fence section.

### Rare Natural Communities, Plants, and Animals

Two natural communities in the project area are considered rare by the Hawai'i Natural

Heritage Program: *Deschampsia nubigena* Subalpine Mesic Grassland, and *Sophora chrysophylla* Subalpine Dry Forest. Numerous large streams also course through the project area. (A portion of the water from most of these is harvested for irrigation and drinking water.)

Nineteen plants considered rare by the Hawai'i Natural Heritage Program have been reported from the project area (see Appendix 1); four of these are on the federal list of endangered species, one is officially listed as threatened, and the U.S. Fish and Wildlife Service has proposed another to be listed as endangered.

The project area contains important habitat for five species of endangered forest birds: ākohekohe, Maui parrotbill, nukupu'u, 'ākepa, and po'ouli. Three other endangered animals, 'ua'u (Hawaiian dark-rumped petrel), nēnē, and the 'ōpe'ape'a (Hawaiian hoary bat), have also been reported from the project area.

#### ***Historical/Archaeological and Cultural Sites***

The state Historic Preservation Division (SHP) does not have any records of historic sites in the vicinity of the proposed fencelines. There are also no records of previous archaeological surveys or inspections in these areas; therefore, good predictive models for the project area are lacking. According to SHP, available information indicates that certain types of sites, such as permanent habitation sites, extensive agricultural complexes, or large ceremonial sites, are not likely to occur at the elevations of the fencing project. However, traditional trails, temporary shelters, small shrines, burials, and specialized agricultural features might occur.

Each fenceline will be surveyed for rare species prior to construction (see Technical description below). The EMWP will invite SHP staff to participate in those visits to perform concurrent archaeological inspections. The fence will then be planned to avoid any historic sites that are found.

#### ***Sensitive Habitats***

The habitats and resources listed above and in the appendix are regarded as sensitive. The intent of the proposed action is to provide long-term protection to these habitats and resources. Potential negative effects such as introduction of new weeds are recognized, and standard precautions will be taken to minimize the risks.

## **IV. General Description of the Action's Technical, Socio-economic and Environmental Characteristics**

### ***Technical***

Construction of these fences is expected to proceed as follows: First the fence corridor will be surveyed by botanists to locate any rare species or other special vegetation that should be protected. Then the exact fence route will be determined and cleared with hand tools and small power tools. This clearing will be done in a strip no more than 4 feet wide. Felling of large trees will be avoided wherever possible. The second phase is actual installation of the fence. Materials and workers will be flown in by helicopter, and all construction work will be done with hand and small power tools. This construction involves driving galvanized steel fence posts into the ground 10 feet apart, attaching one strand of galvanized barbed wire to the posts at ground level, and stretching 39-inch-high, galvanized hog wire along the posts. Where necessary, reinforced corner posts will be used to add strength at critical points, and additional hog wire sections will be anchored along the bottom of the fence to prevent pigs from digging under it. Metal anchor stakes will be added to ensure that the fence fits closely to the ground.

This work will be carried out by trained crews of two to six people who will live in temporary field camps along the fenceline for several days per work session. These crews will be ferried to and from the work site by helicopter and will communicate with the outside via two-way radios. All work will be closely supervised by experienced forest managers employed by EMWP member organizations.

For the first year following construction, members of the partnership will inspect and maintain the fences every month to check for and repair damage. The inspection frequency for the following years has not been determined, but visits will be made at least semi-annually.

### ***Socio-economic***

The proposed fences are needed to protect a stable water source for Maui's residents and businesses. Native vegetation is an essential component of this watershed system. Forest cover protects fragile mountain soils from erosion, and acts like an immense sponge that absorbs heavy rains. Water is gradually released into streams and groundwater aquifers, rather than running off the surface in torrents to the sea. Fence construction and the reduction in feral pig numbers will help ensure a stable water regime both within and below the project area by reducing the potential for rapid runoff from disturbed or degraded areas. In addition, this project will help protect and preserve some of the best remaining habitat for endangered forest birds in Hawai'i, as well as federally endangered and threatened plants, and other endemic species.

Hunting is legally allowed on state lands both above and below the proposed fences. However, largely because the proposed fences are in such remote areas, it is rare for hunters to utilize the upper project area (Douglas Chong, pers. comm.). It is the intent of the EMWP to remove all pigs from the upper project area. Much of the state-owned land below the proposed fences is leased by EMI for water collection purposes, and contains roads and other structures owned by EMI. Vehicular access on EMI roads for hunters has been restricted to members of a hunting club (Upcountry Hunter & Sportsman Club). However, the state and EMI plan to implement a new vehicular access agreement to improve access for public hunting utilizing roads owned and maintained by EMI, and to provide state game management supervision of the expanded hunting program. This public hunting area makes up over half of the forested watershed (over 50,000 acres). Licensed public hunters will be allowed to take pigs from the area on designated hunting days which are not in conflict with EMI's operations, and in accordance with state hunting regulations.

In areas downslope of the fence that are used by pig hunters, neither the short-term nor the long-term effects on hunting can be predicted. The intention of the EMWP is to allow local hunters to continue to enjoy hunting in the area and to provide meat for home use. This should serve to keep the lowland pig population in check, while the fences prevent pigs from moving into the more pristine uplands.

### ***Environmental***

This project will benefit the environment by maintaining and restoring native ecosystems, preserving biological diversity, and ensuring continued water quality and supply. These benefits far outweigh the expected and potential impacts described below.

The clearing of the fenceline and initial construction will cause disturbance to plants along a 4-foot wide corridor, around field camps, and on temporary trails used by the crew. Based on similar work in East Maui forests, this damage will be temporary and will heal naturally within a period of months. Temporary field camps will be set up in the forest, and a number of small helicopter landing zones (the number will be determined by the terrain) will be cleared. The fenceline will be surveyed by a botanist to ensure that no rare or endangered plants are harmed.

Periodic increases in the noise level (due to helicopters and the use of small power tools) could disturb forest birds in the immediate vicinity of the fence. However, much of the construction will occur at the fringe of habitat for endangered forest birds. We do not anticipate any significant adverse effects on insects, snails, or other native fauna. Soil disturbance is expected to be temporary and confined to the fenceline, campsites, and temporary trails. No changes in normal rainwater runoff or percolation are expected, and special care will be taken to avoid such problems as they would threaten the integrity of the fence.

Construction of these fences will interrupt any existing travel routes used by pigs moving between upland and lowland areas. It is critical, therefore, that pig control work get underway in

coordination with fence construction to be sure that pigs do not cause severe forest damage as they attempt to cross the new fencelines.

## **V. Proposed Mitigation Measures**

In all of the sites disturbed by the fence construction and maintenance, strict protocols will be used to 1) clean all gear carried into the forest to prevent the introduction of new weeds or other pests, 2) monitor for and remove as necessary any weeds that become established or expand as a result of the disturbance, 3) prevent local increases in rats around field camps, and 4) remove all rubbish.

Fence construction could affect cultural or archaeological sites, if present. A recent review of State Historic Preservation Division maps revealed no sites in the vicinity of the proposed fences; however, it is likely that the area has not been surveyed by archaeologists. If any evidence indicating the existence of archaeological sites is found, work on the project will halt immediately until proper authorities can be notified and mitigation actions can be planned.

## **VI. Alternatives Considered**

We have identified five alternatives:

### ***Alternative 1.***

#### ***Build Phase 1 and Phase 2 Fences as Proposed***

Follow through with project to full scope and construct Phase 1 and Phase 2 fences (contingent upon additional funding). Phase 1 sections include a 1.6-mile section along the 3,600-foot elevation contour across Ko'olau Gap, and a 0.7-mile fence in the Waikamoi / Honomanū area at approximately 3,700 feet. One Phase 2 fence is located just east of Ko'olau Gap (approximately 3.6 miles long); the other is a connecting fence (approximately 1.6 miles long) along a portion of the western boundary of Hanawī NAR.

The proposed fence locations take advantage of existing barriers, fences, and steep topography, thereby affording the best protection to upper areas at the lowest cost. This will allow pig removal within 9,788 acres of relatively pristine watershed, and habitat for some of the world's most critically endangered birds.

This is the preferred alternative.

**Alternative 2.**

**No Action**

Without new fences, the project area cannot be adequately protected from feral pigs. Under this alternative, native plants, animals, and their habitat would continue to be degraded by pigs, with expected continued loss of native species, habitat, and watershed qualities.

**Alternative 3.**

**Construct the Fences at Higher Elevations**

Construction of the fences at higher elevations (somewhere between the proposed fences and the northeast boundary of Waikamoi Preserve, see Figure 1) would decrease the size of the area protected. Because hunting is uncommon at these elevations, valuable habitat below these higher fences would continue to be degraded by uncontrolled pigs and the weeds they spread. Endangered species and their habitat might be lost. Also, much of the terrain upslope of the proposed fences is rougher and steeper. As a result, construction of fences at higher elevations could be more expensive and time-consuming. The long-term costs of managing the smaller area, however, might be lower.

**Alternative 4.**

**Construct only Phase 1 Fences**

We have documented that pig levels in the Ko'olau Gap and Honomanū areas are higher than in the forest north of Hanakauhi. Therefore, construction of the Phase 1 fences is a higher priority than the Phase 2 fences. However, the Phase 2 fences are needed to effectively seal off the upper area from pigs, enabling us to reach the management objective of zero pigs, improving the effectiveness of management, and reducing costs in the long term. Without the Phase 2 fences, the upper areas are still subject to pig ingress and will require perpetual pig control.

**Alternative 5.**

**Construct the Fences at Lower Elevations**

Fences could be constructed at lower elevations (herein defined as below 2,500 feet elevation) to protect additional native forest that occurs there. This would substantially increase the size of the area protected, increasing management costs. The project's impact on public hunting would probably be greater, since the goal would still be to remove all pigs above the fences.

## **VII. Determination**

As outlined in Section 11-200-12 of the Hawaii Environmental Impact Statement Rules, no significant negative impacts to the environment are expected to result from the implementation of the proposed activities.

## **VIII. Findings, and Reasons Supporting Determination**

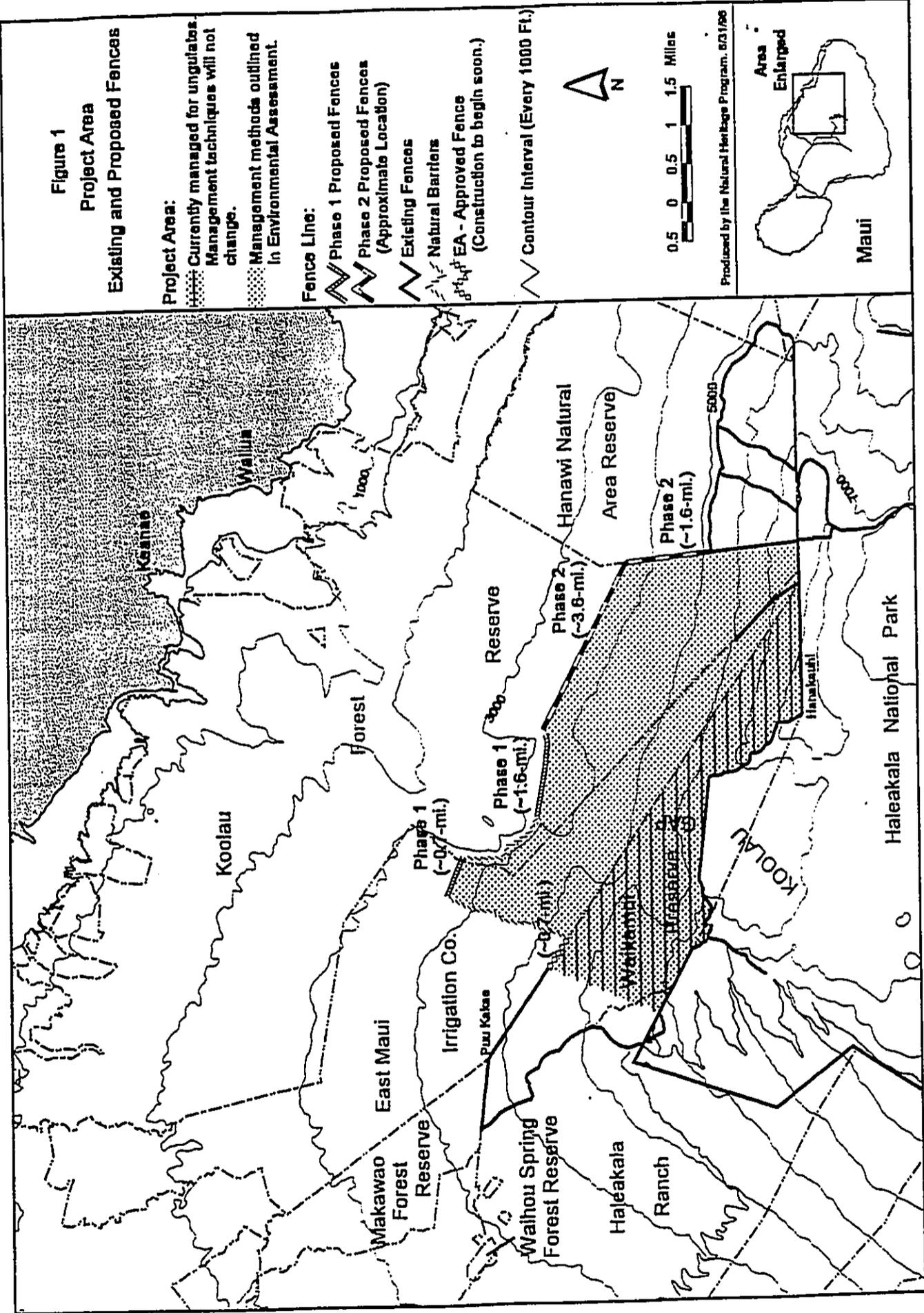
In the long term, all activities are expected to be beneficial, or to have no negative effect. The proposed fences are expected to benefit native species (including rare and endangered plants and animals), native natural communities, and important watershed on windward East Maui. By reducing browsing and other types of ungulate damage (including the spread of certain weeds), the proposed fences, and the control measures that will follow fence construction, will help promote a more stable water regime, and protect native plants and animals within the project area. These actions are also expected to allow passive restoration of native areas previously damaged by feral pigs.

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.

## **IX. EA Preparation Information**

This Environmental Assessment was prepared on behalf of the East Maui Watershed Partnership by:

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



## X. Appendices

### Appendix 1. Rare Plants and Animals Reported From the Project Area<sup>1</sup>:

Scientific Name	Common Name	Heritage Global Rank (a)	Federal Status (b)
<b>Plants</b>			
<i>Argyroxiphium sandwicense</i> ssp. <i>macrocephalum</i> *	'Ahinahina, silversword	G2T2	LT
<i>Argyroxiphium virescens</i> *	Greensword	G1	
<i>Asplenium hobbdi</i>		G1	
<i>Asplenium schizophyllum</i>		G1	
<i>Bidens campylotheca</i> ssp. <i>pentamera</i> †	Ko'oko'olau, koko'olau	G2T2	
<i>Calamagrostis expansa</i>		G2	
<i>Clermontia tuberculata</i> *	'Ohā, 'ōhā wai	G1	
<i>Cyanea horrida</i> *	'Ohā, hāhā, 'ōhā wai	G2	
<i>Cyanea kunthiana</i> †	'Ohā, hāhā, 'ōhā wai	G2	
<i>Diplazium molokaiense</i>		G1	LE
<i>Geranium arboreum</i> *	Hinahina, nohoanu	G1	LE
<i>Geranium multiflorum</i> *	Hinahina, nohoanu	G2	LE
<i>Lagenifera maviensis</i> †	Howaiulu	G2	
<i>Melicope orbicularis</i> †	Alani	G1	
<i>Phyllostegia bracteata</i> †		G1	
<i>Plantago princeps</i> var. <i>laxiflora</i>	Ale	G2T1	LE
<i>Platanthera holochila</i>		G1	PE
<i>Ranunculus mauiensis</i>	Makou	G2	
<i>Wikstroemia villosa</i> †	'Akia	GH	
<b>Animals</b>			
<i>Branta sandwicensis</i>	Nēnē, Hawaiian Goose	G1	LE
<i>Hemignathus lucidus</i>	Nukupu'u	G1	LE
<i>Lasiurus cinereus semotus</i>	'Ōpe'ape'a, Hawaiian Hoary Bat	G5T2	LE
<i>Loxops coccineus</i>	'Akepa, 'Akepeu'ie	G2	LE
<i>Melamprosops phaeosoma</i> *	Po'ouli	G1	LE
<i>Palmeria dolei</i> *	'Akohekohe, Crested Honeycreeper	G2	LE
<i>Pseudonestor xanthophrys</i> *	Maui Parrotbill	G1	LE
<i>Psittirostra psittacea</i> ^	'O'ū	G1	LE

<sup>1</sup> Not all of these species are expected to occur along the fenceline. However, all of them have been reported (currently or historically) in the general vicinity of the proposed fences.

Scientific Name	Common Name	Heritage Global Rank (a)	Federal Status (b)
<i>Pterodroma phaeopygia</i>	'Ua'u, Dark-rumped Petrel	G2	LE

†Known only from Maui.

\*Known only from East Maui.

^Now considered extinct on Maui.

(a) Key to Global Ranks as defined by the Hawai'i Natural Heritage Program:

G1 - Species critically imperiled globally (typically 1 to 5 current occurrences).

G2 - Species imperiled globally (typically 6 to 20 current occurrences).

G5 - Species secure.

GH - Species known only from historical occurrences (not reported in the last 15 years).

T1 - Subspecies or variety critically imperiled globally.

T2 - Subspecies or variety imperiled globally.

(b) Federal Status

LE - Listed as endangered by the U.S. Fish & Wildlife Service.

LT - Listed as threatened by the U.S. Fish & Wildlife Service.

PE - Proposed for listing as endangered by the U.S. Fish & Wildlife Service.

***Appendix 2. Responses to Comments on the Draft Environmental Assessment.***



SEP 13 1996

*For the Protection of Hawaii's Native Wildlife*

## HAWAII AUDUBON SOCIETY

1088 BISHOP ST., SUITE 808 • HONOLULU, HAWAII 96813 • PHONE: (808) 528-1432  
FAX: (808) 537-5294

September 6, 1996

Dr. Betsy Gagne  
Department of Land and Natural Resources  
Division of Forestry and Wildlife  
1151 Punchbowl St. Room 325  
Honolulu, Hawaii 96813

Dear Dr. Gagne,

The Hawai'i Audubon Society strongly supports the preferred alternative for the Phase I and II construction of four fences in the East Maui Watershed. Given the length of project construction and subsequent hunting activities, we are concerned that these efforts will overlap the known nesting periods of endangered and non-endangered native forest birds. However, as this appears unavoidable, we trust that the necessary precautions will be undertaken to minimize disturbances should breeding behavior and nesting efforts of any native forest birds be observed in project areas. We also strongly support the proposed mitigation measures to prevent the introduction or spread of alien plants or pests in project areas. We have the following more specific concerns regarding fence construction, maintenance, pig removals, and monitoring the effects of pig removal.

### Fence Construction:

Of serious concern to HAS is the presence of high populations of feral pigs in concentrated areas once Phase I fencing efforts are completed. Installation of one-way pig gates along major pig trails that cross the proposed fenceline is one option to facilitate the removal of pigs from preserve areas and into public hunting areas down slope.

### Maintenance of Fenceline:

Additionally we trust that fence lines will receive regular inspections and maintenance as needed, particularly after storm events. To minimize disturbances from helicopters and to aid maintenance efforts, we recommend, if not already planned, the storage of material caches for maintenance work along fence lines.

### Pig Removals:

The HAS supports the use of snares in remote areas where other measures are not cost-effective or where drive efforts using dog teams and/or helicopters would traverse particularly sensitive areas. We also support efforts at increasing the knowledge of feral pig populations and their ecology in the East Maui Watershed area to assist in hunting/subsistence efforts. Collecting the age, sex, girth, weight, food and parasite data from feral pigs hunted by EMWP teams should help determine the size and age structure of baseline populations.



Recovery of Native Species Following Pig Removal:

Considerable work is currently being done in exclosure studies to monitor the recovery of native plants and the persistence of alien vegetation in areas where feral ungulates have been removed. HAS is concerned that the response of alien and native fauna (snails, insects, non-endangered forest birds) to ungulate removal may go undocumented or under documented. Should funds or resources become available, we hope that not only the baseline status of understudied species be determined prior to completion of Phase I and II, but also that community and species level changes of alien and native fauna be monitored following pig removal.

Thank you for your efforts in preserving our natural heritage. If you have any questions, please contact us at our above office number and address.

Sincerely,



Daniel K. Sailer  
Conservation Chair

cc: OEQC  
DLNR, DOFAW

BENJAMIN J. CAYETANO  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF FORESTRY AND WILDLIFE  
KENDALL BUILDING  
888 MILILANI STREET, SUITE 700  
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MICHAEL D. WILSON  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY  
GILBERT S. COLOMA-AGARAN

AQUACULTURE DEVELOPMENT  
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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

September 26, 1996

Mr. Daniel K. Sailer, Conservation Chair  
Hawai'i Audubon Society  
1088 Bishop Street, Suite 808  
Honolulu, Hawai'i 96813

Dear Mr. Sailer,

Thank you for reviewing and commenting upon the *Draft Environmental Assessment for a Fence Project to protect the East Maui Watershed*. You raise several important points in your letter. These are discussed below.

Native Forest Birds

You are concerned that the project efforts will overlap the known nesting periods of endangered and non-endangered native forest birds. According to data from the U.S. Fish & Wildlife Service, the project fence sections for which we have funding (Phase I) are not in endangered forest bird habitat. Approximately 1.6 miles of the Phase II fence does follow the west boundary of the Hanawi Natural Area Reserve through endangered forest bird habitat (for 'akohekohe, Maui parrotbill, and 'akepa). We feel confident that any short-term disruption of both endangered and non-endangered bird behavior will be greatly outweighed by the long-term protection of bird habitat. Also, Ron Nagata, Chief of Resources Management at Haleakala National Park, will be overseeing the construction on behalf of the Research Corporation of the University of Hawai'i. Mr. Nagata has many years of experience directing fence crews in building 49 miles of fence throughout the national park and its endangered bird habitat.

Fence Construction

You are concerned about concentrated populations of feral pigs once Phase I fences are completed. We are seriously considering the inclusion of one-way pig gates in the fence

design. Several designs have been tested by different private and state agencies in Hawai'i and in New Zealand. We have not yet determined which one would be most effective.

#### Maintenance of Fenceline

The Nature Conservancy of Hawai'i, one of the East Maui Watershed Partnership (EMWP) members, will be responsible for regular fence inspection and maintenance (including after major storms). This will be carried out through The Conservancy's Maui Preserves Office until the EMWP secures alternative funding for this responsibility. During fence construction, fence material caches will be stored along the fence lines to aid later maintenance efforts, and to minimize disturbance from (and the expense of) additional use of helicopters.

#### Pig Removals

You support efforts to help increase our knowledge of feral pig populations and their ecology in the East Maui Watershed area to assist in hunting/subsistence efforts. The most useful information for this purpose will be gained primarily from our planned scouting of the area. The necropsy data you suggest we collect has been collected for years by Hawai'i Volcanoes National Park, and in the East Maui watershed by both The Nature Conservancy and Haleakala National Park. Hence, good information already exists from these and other studies to support our efforts at pig eradication. However, it is our intent to encourage and facilitate outside research efforts in these areas.

#### Recovery of Native Species Following Pig Removal

You are concerned that the response of alien and native fauna to ungulate removal may go undocumented. This is a common concern among biologists and land managers in Hawai'i. Yet still, there is little agreement on a practical method of quantifying these responses, particularly for invertebrates (a bulk of which are species yet to be described). So unfortunately, the detailed monitoring, research, and analysis required to determine these responses are beyond the resources and short-term needs of the EMWP. However, the U.S. Fish and Wildlife Service does conduct regular forest bird surveys. Also, EMWP members work with the Secretariat of Conservation Biology through the Hawai'i Conservation Biology Initiative to promote research on projects such as those above. Again, it is our intent to encourage and facilitate such efforts.

Once again, thank you for your interest in this project. Please feel free to contact me if you have further questions.

Sincerely,

  
Betsy Gagne

NARS Executive Secretary

BENJAMIN J. CAYETANO  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF FORESTRY AND WILDLIFE  
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FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
LAND MANAGEMENT  
STATE PARKS  
WATER AND LAND DEVELOPMENT  
WATER RESOURCE MANAGEMENT

September 25, 1996

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

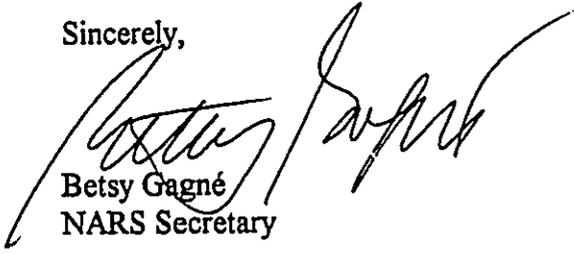
Dear Mr. Gill:

Thank you for reviewing and commenting upon the *Draft Environmental Assessment for a Fence Project to Protect the East Maui Watershed*. Your letter to Michael Wilson (dated September 4, 1996) was passed on to me for response. Below I discuss your three comments in turn.

1. Regarding other known plans to protect the East Maui Watershed: The Nature Conservancy (in partnership with Haleakala Ranch Co.), the State, and the National Park Service are actively managing their lands on East Maui. At Haleakala National Park, Waikamoi Preserve, and Hanawi Natural Area Reserve, management is aimed at preserving rare and endangered plants and animals, and their habitat. Common management activities include ungulate control, weed control, and monitoring. The State's Forest Reserves on East Maui are managed primarily for watershed protection. In addition, the East Maui Watershed Partnership is leading an effort to eradicate the weed *Miconia calvescens* on Maui. Finally, as is mentioned in the draft and final environmental assessments, the Partnership also has plans to improve hunter access in a portion of the watershed area below the proposed fencing. All these activities share a common goal: to preserve East Maui's forest watershed for future generations.
2. The draft environmental assessment stated that funding has been secured only for phase 1 of the proposed fencing. This funding comes from a 1995 state budget proviso (Act 218, SLH 1995, Part II, Section 26). An allocation of \$490,000 has been made for this project, which is one portion of a larger watershed protection project. The above information has been added to the final environmental assessment.
3. The determination of no significant impact will be included in the final environmental assessment, and will be based on the criteria outlined in Section 11-200-12 of the Hawaii Environmental Impact Statement Rules. In the long term, all activities are expected to be beneficial, or to have no negative effect.

Once again, thank you for your interest in this project.

Sincerely,



Betsy Gagné  
NARS Secretary

cc  
Mike Wilson

SEP - 6 1996

BENJAMIN J. CAYETANO  
GOVERNOR



GARY GILL  
DIRECTOR

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

220 SOUTH KING STREET  
FOURTH FLOOR  
HONOLULU, HAWAII 96813  
TELEPHONE (808) 586-4185  
FACSIMILE (808) 586-4186

September 4, 1996

Mr. Michael Wilson, Chair  
Department of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Draft Environmental Assessment for the East Maui  
Watershed Fence Project, Maui

Thank you for the opportunity to review the subject document. We have the following comments.

1. Please describe all other known plans to protect the East Maui Watershed. What are the cumulative impacts of all the proposed activities to preserve the watershed?
2. Please describe the cost and funding sources for this project.
3. Please provide reasons for supporting the determination based on an analysis of the significance criteria in section 11-200-12 of the Hawaii Environmental Impact Statement Rules.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

*Jeyan Thirugnanam*

for  
Gary Gill  
Director

c: TNCH