STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawaii 96813

May 13, 2016

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

Land Board Members:

SUBJECT: REQUEST FOR APPROVAL OF THE FINAL ENVIRONMENTAL ASSESSMENT FOR THE PALILA DISCOVERY INTERPRETIVE TRAIL IN THE KAOHE AREA OF MAUNA KEA

AND

REQUEST FOR AUTHORIZATION FOR THE CHAIR TO ISSUE A FINDING OF NO SIGNIFICANT IMPACT (FONSI)

BACKGROUND:

The Mauna Kea Forest Restoration Project (MKFRP) of the Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW), is collaborating with the American Bird Conservancy and other private and public partners to construct and maintain the Palila Forest Discovery Trail. This multi-faceted initiative includes trail building and access improvements, informational signage and kiosks, website and literature development, volunteer management, and forest restoration. The 0.92-mile, self-led loop trail will meander through a representative and mostly-intact portion of the high-elevation forest dominated by native māmane and naio trees on the western slope of Mauna Kea. Four kiosks placed along the trail and other small markers with QR codes for smartphones will provide detailed information. Native plant species will be planted in areas where the forest is in need of restoration from over 200 years of grazing and browsing by non-native mammals. Planting will improve habitat for the critically endangered palila as well as other endangered native birds such as Hawai'i creeper and 'akiapōlā'au.

Hikers will be self-led through the loop trail and exposed to several interpretive opportunities. Four kiosks placed strategically along the trail at key points will provide detailed information about the area.In addition, small informational markers will be placed along the trail that will also include a QR code to link hikers with smartphones with additional information such as bird

ITEM C-2

calls and plant IDs. Visitors and residents alike will be able to explore and learn about a part of Hawai'i few know even exists. In order to minimize forest disturbance, the trail is designed as a "Wildland" trail using the natural dirt tread. To accommodate for ADA users, the main trailhead kiosk sign will summarize all the key points along the trail. In addition, there will be a companion website linked through QR codes that detail points of interest along the trail. Even from the parking area, a user will be able experience the main features of the trail.

The project will place a daily average of about 10 additional users in the Pu'u Lā'au area of the Mauna Kea Forest Reserve and Ka'ohe Game Management Area, which brings with it some impacts. DOFAW will need to slightly increase road maintenance. Currently there is a pit toilet at the Kilohana Hunter Checking Station, where all users must check in before driving to the trail or other Pu'u Lā'au locations. Depending on future funding availability, DOFAW intends to install composting toilets near the top of the trail in an area previously used as a gravel quarry. This facility would service all users of the Pu'u Lā'au area, including hunters, birders, hikers and researchers, who jointly currently average about 5 to 10 users per day. Depending on future funding availability, a sheltered picnic area may also be constructed at the parking area near the trail head. Although any use of the wildland areas increases wildfire risk, the area is already utilized by diverse users, and adding some hikers on the trail should not unduly increase risk. Fire protection infrastructure in the form of diptanks and fire roads are directly adjacent to the trail. To reduce any fire risk, the parking area will be mowed frequently to prevent hot car exhaust systems from igniting tall grass, and fire prevention signage will also be installed at the trail head. In addition to its ongoing quarterly incipient invasive species checks, MKFRP will maintain a sign at the checking station advising users to clean boots and gear prior to hiking to minimize introduction of invasive species.

Chapter 11-200-12, Hawai'i Administrative Rules, outlines those factors agencies must consider when determining whether an Action has significant effects:

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost, and the project would promote protection, interpretation and enjoyment of the forest resources.

2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed project expands and in no way curtails beneficial uses of the environment.

3. *The proposed project will not conflict with the State's long-term environmental policies.* The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project has a minor footprint, has been designed to avoid environmental impacts and fulfills aspects of these policies calling for protection and public enjoyment of the natural environment. It is thus consistent with all elements of the State's long-term environmental policies.

4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will benefit the economic and social welfare of the community by enhancing recreation protection.

5. *The proposed project does not substantially affect public health in any detrimental way.* The proposed project will benefit public health by promoting an outdoor recreation use.

6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected to result from the proposed action. The project will not enable development or cause in-migration.

7. *The proposed project will not involve a substantial degradation of environmental quality.* The project will not degrade the environment in any substantial way.

8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project is meant primarily to promote recreational enjoyment and awareness of the habitat for the endangered palila. Trail construction will be scheduled and conducted to minimize impacts to palila and other endangered birds. The area has been inspected by biologists from DOFAW/MKFRP and no endangered plant species is present.

9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is not related to additional activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.

10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.*
No adverse effects on these resources would occur. Ambient noise impacts due to construction will be extremely minor and timed to avoid impact to sensitive fauna, particularly palila.

11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the project is located in an area with seismic risk, the entire Island of Hawai'i shares this risk, and the project involves no structures other than kiosks and would not be imprudent to construct.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas or viewplanes identified in the Hawai'i County General Plan will be adversely affected by the project, and visual impacts will be negligible and/or beneficial, in that the project would provide good viewing points for hikers.

13. *The project will not require substantial energy consumption.* The project involves only minor energy use and no adverse effects are expected.

For the reasons above, the proposed action is not expected to have any significant effect in the context of Chapter 343, Hawai'i Revised Statues and section 11-200-12 of the State Administrative Rules.

RECOMMENDATIONS:

That the Board:

1) Approve the Final Environmental Assessment for the Palila Discovery Interpretive Trail

2) Authorize the Chairperson to issue a Finding of No Significant Impact (FONSI) for this project.

Respectfully submitted,

DAVID SMITH, Administrator
Division of Forestry and Wildlife

APPROVED FOR SUBMITTAL:

SUZANNE D. CASE, Chairperson
Board of Land and Natural Resources

Attachments

A. Final Environmental Assessment for the Palila Discovery Trail in the Kaohe District of Mauna Kea.

FINAL ENVIRONMENTAL ASSESSMENT

Palila Forest Discovery Trail

TMK (3rd.) 4-4-015:004 (por.)
Hamakua District, Hawai'i Island, State of Hawai'i

May 2016

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

FINAL ENVIRONMENTAL ASSESSMENT

Palila Forest Discovery Trail

TMK (3rd.) 4-4-015:004 (por.)
Hamakua District, Hawai'i Island, State of Hawai'i

PROPOSING/
APPROVING AGENCY:

State of Hawai'i
Department of Land and Natural Resources
PO Box 621
Honolulu, HI 96809

CONSULTANT:

Geometrician Associates LLC
PO Box 396
Hilo, HI 96721

CLASS OF ACTION:

Use of State Land
Use of State Funds

This document is prepared pursuant to:

The Hawai'i Environmental Protection Act,
Chapter 343, Hawai'i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai'i Department of Health Administrative Rules (HAR).

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SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The Mauna Kea Forest Restoration Project (MKFRP) of the Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW), is collaborating with the American Bird Conservancy and other private and public partners to construct and maintain the Palila Forest Discovery Trail. This multi-faceted initiative includes trail building and access improvements, informational signage and kiosks, website and literature development, volunteer management, and forest restoration. The 0.92-mile, self-led loop trail will meander through a representative and mostly-intact portion of the high-elevation forest dominated by native māmane and naio trees on the western slope of Mauna Kea. Four kiosks placed along the trail and other small markers with QR codes for smartphones will provide detailed information. Native plant species will be planted in areas where the forest is in need of restoration from over 200 years of grazing and browsing by non-native mammals. Planting will improve habitat for the critically endangered palila as well as other endangered native birds such as Hawai'i creeper and 'akiapōlā'au.

Disturbance of vegetation will be restricted to just the extent necessary to accommodate a trail, which can be moved and adjusted to avoid removing most individuals of native species. Ground disturbance associated with the project will be very minimal and limited to hand tool labor, step-building, rock-stacking and kiosk and sign emplacement. Because of these limitations, no grading or NPDES permits will be required, although erosion, sedimentation and dust will be controlled. The trail is located within the Conservation District and Palila Critical Habitat, and the project will protect the values of these areas. No threatened or endangered (T&E) plant species are present at or near the disturbance footprint, and the purpose of the project is to enhance education about and protection for native species, including the endangered palila. Timing of project activities will avoid or minimize impacts to T&E birds. No historic or cultural properties will be affected. Adverse visual impact will be extremely minor and compensated for by the addition of viewpoints for hikers of the forest and wider landscape. Depending on future funding availability, DOFAW intends to install composting toilets and a covered picnic shelter. To reduce any fire risk, the parking area will be mowed frequently to avoid any hot car exhaust systems from igniting tall gas, and fire prevention signage will also be installed at the trailhead. In addition to its ongoing quarterly incipient invasive species checks, MKFRP will maintain a sign at the checking station advising users to clean boots and gear prior to hiking to minimize introduction of invasive species.

PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location and Description

The Mauna Kea Forest Restoration Project (MKFRP) of the Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW), is collaborating with the American Bird Conservancy, the Mauna Kea Beach Hotel, and several community volunteer groups to construct and maintain the Palila Forest Discovery Trail. This multi-faceted initiative includes trail building and access improvements, informational signage and kiosks, website and literature development, volunteer management, and forest restoration. The 0.92-mile loop trail will meander through a representative and mostly intact portion of the high-elevation forest dominated by native māmane and naio trees on the slopes of Pu'u Lā'au, Mauna Kea (Figures 1-4).

To construct the trail, between 5 and 20 volunteers would work over the course of about seven days spread out over approximately a month. Work will involve mainly hand tools such as picks, pruners and pulaskis, with limited use of weedeaters and chainsaws. To avoid erosion, steps and waterbars will be installed using plastic lumber in strategic locations along the trail. No heavy equipment would be used, and no grading would take place. Construction would commence in the summer of 2016. The project would cost approximately $170,255, which includes about $20,000 in State funding, $31,000 in equivalent volunteer hours, and almost $120,000 in donations from foundations and organizations.

Hikers will be self-led through the loop trail and exposed to several interpretive opportunities. Four kiosks placed strategically along the trail at key points will provide detailed information about the area. In addition, small informational markers will be placed along the trail that will also include a QR code to link hikers with smartphones with additional information such as bird calls and plant IDs. Visitors and residents alike will be able to explore and learn about a part of Hawai'i few know even exists. In order to minimize forest disturbance, the trail is designed as a "Wildland" trail using the natural dirt tread. To accommodate for ADA users, the main trailhead kiosk sign will summarize all the key points along the trail. In addition, there will be a companion website linked through QR codes that detail points of interest along the trail. Even from the parking area, a user will be able experience the main features of the trail.

Native plant species will be planted in areas where the forest is in need of restoration from over 200 years of grazing and browsing by non-native animals including sheep and goats. In a comment to the Draft EA (see Appendix 1b), the Office of Environmental Quality Control requested additional information about planting methods and questioned whether these might have additional environmental impacts that had not been disclosed in the Draft EA. Although every human action has some environmental consequences, adverse effects associated with natural forest restoration are among those actions with very negligible adverse effects. These mainly include the emissions of fossil fuel burned in trucks that transport seedlings, personnel and water to the planting site. However, the net benefit to carbon uptake and storage, not to mention soil stabilization, wildlife and endangered plant habitat, watersheds, scenery and recreation, is very high. The Mauna Kea Forest Restoration Project (MKFRP) will be planting a total of about 6,000 trees: 1,000 of them fairly close to the trail site, and

Figure 1. Trail Map and General Location Map

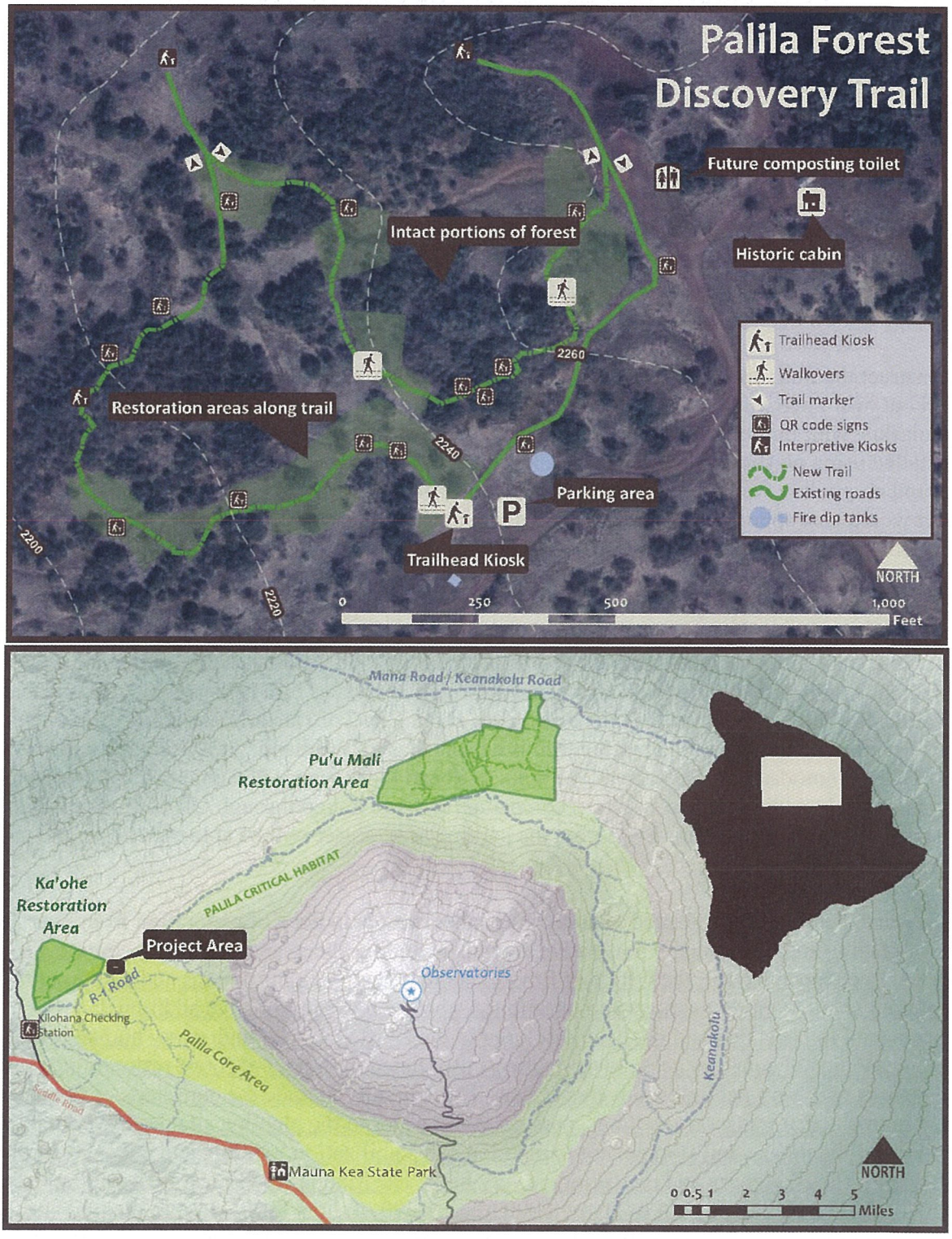


Figure 2. TMK Map

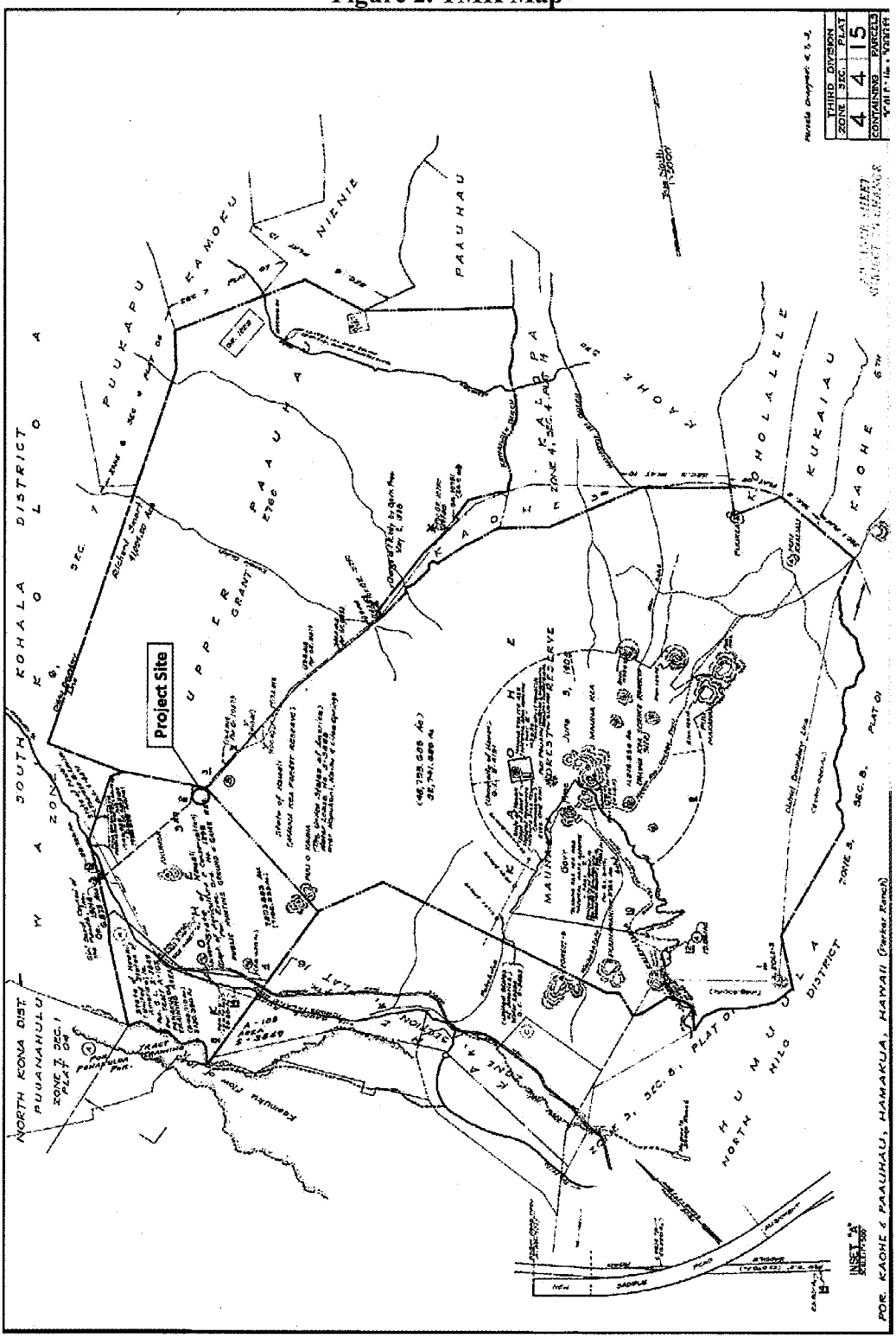
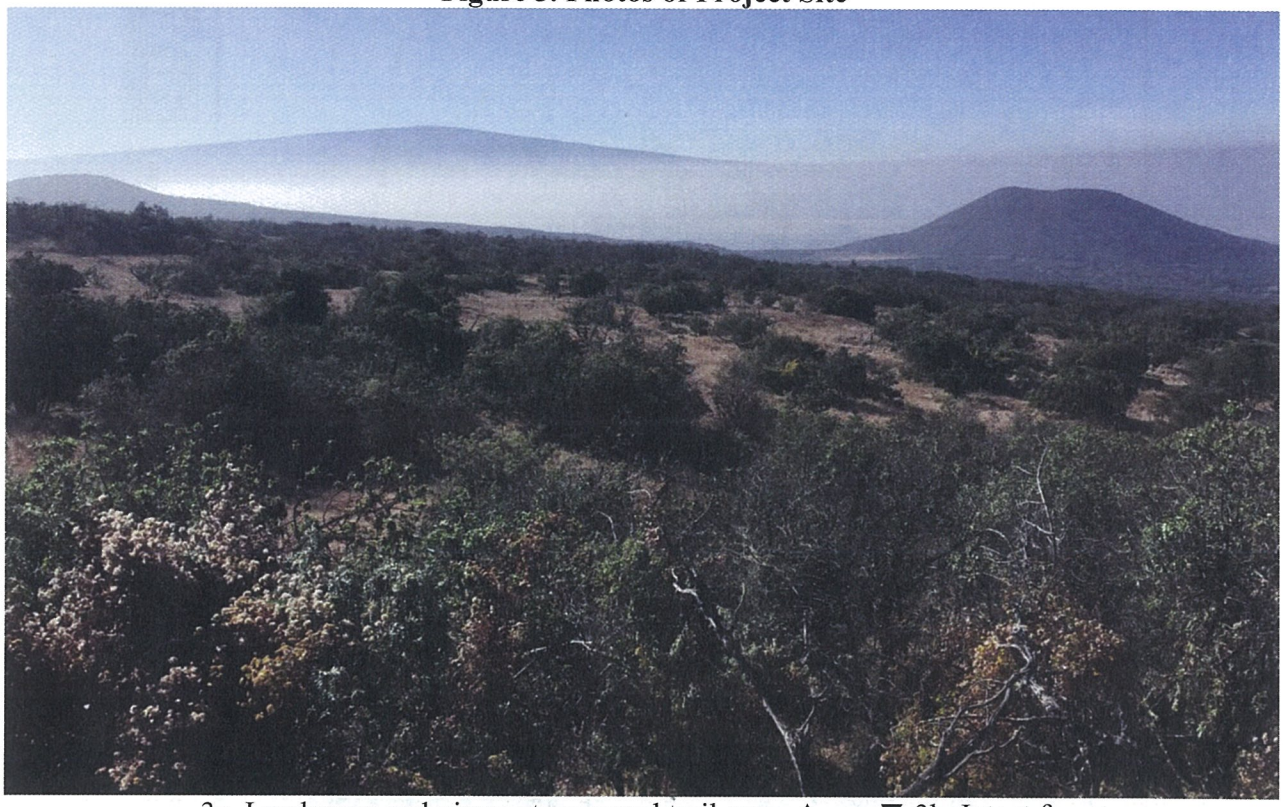


Figure 3. Photos of Project Site

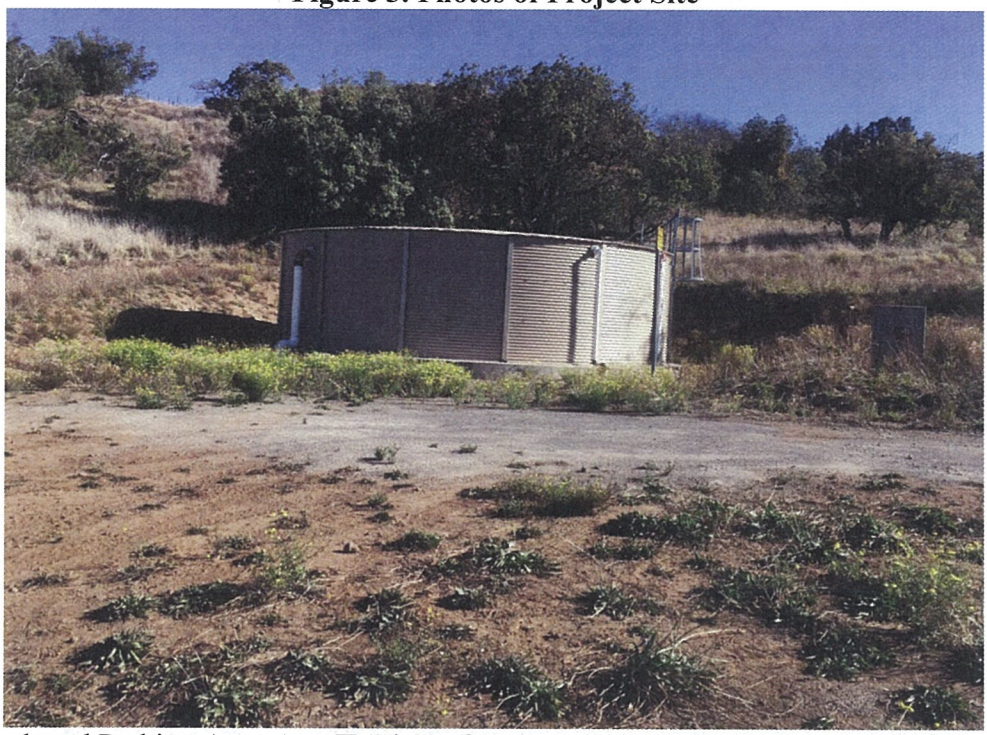


3a. Landscape and views at proposed trail area ▲



▼ 3b. Intact forest

Figure 3. Photos of Project Site



3c. Diptank and Parking Area ▲ ▼ View of proposed compost toilet location from Pu'u Lā'au



Figure 4. Examples of Interpretive Structures



4a. Typical interpretive kiosk for trailhead ▲ ▼ Typical interpretive sign



5,000 in the neighboring Ka'ohe Restoration Area, all of it within Palila Critical Habitat. A mixture of māmane, 'a'ali'i and 'iliahi will be planted to improve and restore habitat for palila. The seed source is directly from the project area. The plants are propagated at both the Waimea State Tree Nursery and the Native Nursery on Maui (State contract). Seedlings will be planted by hand using dibble sticks to make holes, utilizing mostly volunteer labor, with five staff. This is consistent with MKFRP's mandate since 2006 and its current operations of restoring palila habitat. Each plant will be watered by backpack sprayer immediately after planting with about two cups of water. Occasional supplemental hand watering may occur in the following months as practical and if staffing is available. Once the trees are in place and as long as protective fencing is maintained, the forest should thrive on its own. Adverse impacts associated with planting are mitigated by common-sense procedures such as not allowing trucks to drive into vegetated areas, cleaning boots and equipment before planting to avoid spreading invasive species, and monitoring for invasive species. The simple methods of hand planting produce no erosion or sedimentation impacts.

Planting will improve habitat for not only the critically endangered palila (*Loxioides bailleui*) but also other endangered native birds, such as Hawai'i creeper (*Oreomystis mana*) and 'akiapōlā'au (*Hemignathus wilsoni*).

The project will place a daily average of about 10 additional users in the Pu'u Lā'au area of the Mauna Kea Forest Reserve and Ka'ohe Game Management Area, which brings with it some impacts. DOFAW will need to slightly increase road maintenance. Currently there is a pit toilet at the Kilohana Hunter Checking Station, where all users must check in before driving to the trail or other Pu'u Lā'au locations. Depending on future funding availability, DOFAW intends to install composting toilets near the top of the trail in an area previously used as a gravel quarry. This facility would service all users of the Pu'u Lā'au area, including hunters, birders, hikers and researchers, who jointly currently average about 5 to 10 users per day. Depending on future funding availability, a sheltered picnic area may also be constructed at the parking area near the trail head. Although any use of the wildland areas increases wildfire risk, the area is already utilized by diverse users, and adding some hikers on the trail should not unduly increase risk. Fire protection infrastructure in the form of diptanks and fire roads are directly adjacent to the trail. To reduce any fire risk, the parking area will be mowed frequently to prevent hot car exhaust systems from igniting tall grass, and fire prevention signage will also be installed at the trail head. In addition to its ongoing quarterly incipient invasive species checks, MKFRP will maintain a sign at the checking station advising users to clean boots and gear prior to hiking to minimize introduction of invasive species.

1.2 Purpose and Need

The southwest slopes of Mauna Kea above 6,000 feet in elevation are the last refuge of the critically endangered palila (*Loxioides bailleui*), the lone surviving finch-billed honeycreeper found in the main Hawaiian Islands. Over 95 percent of the population is restricted to the southwest slope. Palila have evolved an extremely specialized diet dependent on māmane trees and associated invertebrates for its survival. Therefore, the only habitats able to sustain palila over the long term are large areas of forest that contain dense stands of large māmane trees and incorporate significant elevational or rainfall gradients to provide year-round food sources. A recreational trail that interprets these fascinating birds

and their habitat is an opportunity to provide an enjoyable and healthful recreational experience, which by its very nature advances the awareness and knowledge that assist in protecting this unique resource.

1.3 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai'i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai'i Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawai'i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the finding (anticipated finding, in the Draft EA) that no significant impacts are expected to occur; Part 5 lists each criterion and presents the findings (preliminary, for the Draft EA) for each made by the Hawai'i State Department of Land and Natural Resources (DLNR). If, after considering comments to the Draft EA, and the Board of Land and Natural Resources (BLNR), the official approving agency, concludes that, as anticipated, no significant impacts would be expected to occur, then the agency issues a Finding of No Significant Impact (FONSI), and the action will be permitted to occur. If the approving agency concludes that significant impacts are expected to occur as a result of the proposed action, then an Environmental Impact Statement (EIS) must be prepared.

1.4 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the environmental assessment:

Federal:
- U.S. Army Garrison, Pohakuloa Training Area Commander
- U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office
- U.S. Geological Survey, PIERC Kilauea Field Station

State:
- Department of Health
- Office of Hawaiian Affairs
- Office of Mauna Kea Management
- DLNR, State Historic Preservation Division, Land Division, Office of Conservation and Coastal Lands

County:
- Civil Defense Agency
- County Council
- Fire Department
- Planning Department

Private:

American Bird Conservancy
Hawai'i Forest and Trail
Mauna Kea Beach Hotel
Parker Ranch
Sierra Club
The Nature Conservancy

Copies of communications received during early consultation are contained in Appendix 1a. Comments to the Draft EA and responses to these comments are contained in Appendix 1b. Various places in the EA have been modified to reflect input received in the comment letters; additional or modified non-procedural text is denoted by double underlines, as in this sentence.

PART 2: ALTERNATIVES

2.1 No Action

Under the No Action Alternative, the Palila Forest Discovery Trail would not be constructed. The benefits to recreation and education would not occur, but there would be no vegetation or ground disturbance, and no additional impacts in terms of road use, demand for toilets or wildfire risk. The No Action Alternative it thus provides a baseline for comparison of impacts from the Proposed Action.

2.2 Alternative Locations

The MKFRP considered whether there were any other locations that offered a superior site for the trail or reduced impacts significantly from those associated with the proposed location. The proposed site is on the fringes of palila habitat, providing an ideal location for human interaction while balancing the habitat needs of the palila. Very few other locations with adequate road access and an existing disturbed area for parking and the central kiosk are available, but two other locations were preliminarily considered:

- **Near Kilohana Hunter Checking Station, off Old Saddle Road.** Although this site is convenient to a paved highway, there is little there to provide meaningful interpretation. Palila are only found in the māmane forest, and this site has been degraded solely to grass and shrubland.
- **Near Mauna Kea State Park**. Although a māmane-naio forest is present, parking and restrooms are available, and the area is designated Palila Critical Habitat, there are no longer any palila in the area. The site would not offer meaningful interpretation. Furthermore, most of the site is being transferred to the County of Hawai'i for recreational use and will no longer be under the jurisdiction of DLNR.

As the proposed site appears to be in an optimum location with no substantial environmental or other disadvantages, these alternative sites have not been advanced in this Environmental Assessment.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The approximately 11-acre location of the trail and parking area adjacent to Road 1 makai of the Pu'u La'au Cabin is referred to throughout this EA as the *project site*. The term *project area* is used to describe the general environs of this part of the southwest slope of Mauna Kea.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

Environmental Setting

At about 7,400 feet in elevation, the project site has a cool climate, with daytime temperatures in the low 60s (Fahrenheit) and nighttime temperatures that often dip into the 40s or lower. Annual rainfall averages about 20 to 22 inches (Giambelluca et al 2013). Geologically, the project site is located on the southwestern flank of the Mauna Kea volcano, on hawaiite or mugearite lava flows dating from the late Pleistocene, between 14,000 and 65,000 years before the present (Wolfe and Morris 1996). Soil on the project site is classified by the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) as being in various series of well-drained, stony, very fine sandy loams (U.S. Soil Conservation Service 1973).

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the U.S. Geological Survey in this area of Mauna Kea is Zone 8, on a scale of ascending risk from 9 to 1 (Heliker 1990:23). The low hazard risk is based on the fact that Mauna Kea is a dormant volcano, and most Zone 8 areas have not been affected by lava flows in the past 10,000 years. As such, there is a low risk of lava inundation over relatively short time scales in the project area.

The Island of Hawai'i experiences high seismic activity and is at risk from major earthquake damage (USGS 2000), especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 15, 2006 demonstrated. The project site does not appear to be subject to subsidence, landslides or other forms of mass wasting, although minor slope instability is an issue on the steeper parts of the trail.

Impacts and Mitigation Measures

In a comment to the Draft EA (see Appendix 1b), the Office of Environmental Quality Control requested accounting for the effects of climate change. It is true that worldwide climate change could involve noticeable changes on the climate and vegetation zones of Mauna Kea. Many climate scientists believe that temperatures on the middle slopes of Mauna Kea above the current mean tradewind inversion elevation will become wetter through a rise in that elevation. Others predict drier and warmer

conditions in this zone. The timing and magnitude of these quite opposite effects are not currently determinable. The degree of variability is another unknown. Of course it is also entirely possible that for the near-term future, the climate will remain essentially the same (Hawai'i State Office of Mauna Kea Management 2009). At this point it is only possible to say that a family hiking fifty years from now may observe more native plants and birds on the trail, or less, or the same. Whatever the climate, a short nature trail on the slopes of Mauna Kea would likely continue to be useful and would not have adverse environmental impacts. Climate change will not adversely affect maintenance. DOFAW maintains trails throughout the Big Island, with its full gamut of climates and geological substrates.

In general, geologic conditions impose no constraints on the proposed action, and the proposed trail is not imprudent to construct and utilize. To avoid destabilizing slopes on the trail, it has been designed to meander and switchback. In addition, steps and waterbars will be installed using plastic lumber in strategic locations along the trail.

3.1.2 Drainage, Water Features and Water Quality

Existing Environment

No drainages or flood zones are located in or near the project site. The area is not mapped within the 100-year floodplain on the Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM), and therefore the area is considered Flood Zone X, outside the 100-year floodplain.

Impacts and Mitigation Measure

Because the project involves no grading and will not disturb more than one acre of soil, no grading permit or National Pollutant Discharge Elimination System (NPDES) permit will be necessary. As discussed above, erosion will be avoided by minimizing slopes as feasible through having the trail meander and switchback. Steps and waterbars will be installed using plastic lumber in strategic locations along the trail, which will minimize any potential for erosion. MKFRP will ensure that weedeaters and chainsaws are fueled properly to avoid spillage and that fuels are properly stored. In the unlikely event of significant leaks or spills, they will cleaned up and material disposed of at an approved site.

3.1.3 Flora, Fauna and Ecosystems

Existing Environment, Impacts and Mitigation Measures: Plants

The project site consists primarily of land that was grazed for over a century and is now utilized by game mammals. The original vegetation was a subalpine dry māmane/naio forest (Gagne and Cuddihy 1990), with various native herbs, shrubs and grasses in the understory. The long history of grazing and feral mammal browsing has thinned the forest and replaced native elements in the understory with non-natives, although the original canopy species are still dominant.

Table 1. Plant Species in Proposed Trail Area

Scientific Name	Common Names	Type	Category
Achillea millefolium	common yarrow	herb	naturalized
Anthoxanthum odoratum	sweet vernalgrass	grass	naturalized
Arenaria serpyllifolia	thyme-leaved sandwort	herb	naturalized
Arrhenatherum elatius	no common name	grass	naturalized
Asplenium trichomanes	ʻiwaʻiwa, spleenwort	fern	indigenous
Bidens alba	Spanish needle	herb	naturalized
Bidens pilosa	kī, kī nehe	herb	naturalized
Brassica nigra	black mustard, mākeke	herb	naturalized
Carex wahuensis	no common name	sedge	endemic
Chenopodium oahuense	ʻāweoweo, ʻāheahea	woody shrub	endemic
Cirsium vulgare	bull thistle	herb	naturalized
Conyza bonariensis	hairy horseweed, lani wela	herb	naturalized
Crepis capillaris	smooth hawks'-beard	herb	naturalized
Dactylis glomerata	cocksfoot	grass	naturalized
Delairia odorata	cape ivy, German ivy	vine	naturalized
Dianthus armeria	Depford pink	herb	naturalized
Epilobium billardierianum	willow herb	herb	naturalized
Eragrostis atropioides	lovegrass	grass	endemic
Eragrostis brownei	sheepgrass	grass	naturalized
Erodium cicutarium	pin clover, storksbill	herb	naturalized
Hesperocnide sandwicensis	no common name	herb	endemic
Heterotheca grandiflora	telegraph weed	herb	naturalized
Holcus lanatus	common velvet grass	grass	naturalized
Hypochoeris radicata	hairy cat's ear, gosmore	herb	naturalized
Lepidium bonariense	peppergrass	herb	naturalized
Lepidium hyssopifolium	peppergrass	herb	naturalized
Myoporum sandwicense	naio	tree	indigenous
Panicum tenuifolium	mountain pili	grass	endemic
Pelleae ternifolia	kalamoho, cliff brake	fern	indigenous
Pennisetum clandestinum	kikuyu grass	grass	naturalized
Plantago lanceolata	narrow-leaved plantain	herb	naturalized
Poa pratense	Kentucky bluegrass	grass	naturalized
Rumex acetosella	sheep sorrel	herb	naturalized
Santalum paniculatum	ʻiliahi, sandalwood	tree	endemic
Senecio madagascariensis	fireweed, Madagascar ragwort	herb	naturalized
Senecio syvaticus	wood groundsel	herb	naturalized
Senecio vulgaris	common groundsel	herb	naturalized
Sophora chrysophylla	māmane	tree	endemic
Stenogyne microphylla	no common name	vine	endemic
Stipa cernua	needlegrass	grass	naturalized
Urtica urens	dog nettle	herb	naturalized
Verbascum thapsus	common mullein	herb	naturalized
Verbena Iittoralis	ōwī	herb	naturalized
Verbesina encelioides	golden crown-beard	herb	naturalized
Wahlenbergia gracilis	No common name	herb	naturalized

Expert staff biologists conducted a botanical survey of the project site. No T&E plant species were noted on or near the project site. The primary purpose of the survey was to identify rare and threatened or endangered (T&E) species, but all species encountered were identified (Table 1).

Most of the area through which the trail traverses is dominated by māmane (*Sophora chrysophylla*) and naio (*Myoporum sandwicense*) in the canopy layer. There is also a variety of primarily non-native grasses including orchard grass (*Dactylis glomerata*), *Eragrostis brownei* and sweet vernal grass (*Anthoxanthum odoratum*), the native sedge *Carex wahuensis* as well as the non-native herbs and shrubs fireweed (*Senecio madagascariensis*), narrow-leafed plantain (*Plantago lanceolata*), and mullein (*Verbascum thapsus*), with a few emergent native seedlings. A portion of the trail is within a fenced exclosure that provides a richer native flora, with sandalwood (*Santalum paniculatum*), ʻāweoweo (*Chenopodium oahuense*), ʻulei (*Osteomeles anthyllidifolia*) and *Stenogyne* spp.

Disturbance of individuals of native species will be avoided if at all possible and kept to a minimum where necessary (i.e., pruning low branches). Because of the care that will be taken with building the trail and the absence of rare or threatened or endangered plant species, no substantial adverse impacts to botanical resources would occur as a result of building or using the interpretive trail.

To minimize introduction and spread of invasive species, MKFRP will also maintain a sign at the checking station, where all users must sign in, advising all users (including Palila Forest Discovery Trail hikers) to clean boots and gear prior to hiking. MKFRP will also continue its quarterly incipient invasive species checks in the area, which are part of its ongoing management practices.

Existing Environment, Impacts and Mitigation Measures: Animals

With the exception of the endangered ʻōpeʻapeʻa, or Hawaiian hoary bat (*Lasiurus cinereus semotus*), all terrestrial mammals currently found on the island of Hawaiʻi are alien species. Most are ubiquitous, and none are of conservation concern. Feral sheep and mouflon are present in the Kaʻohe area. The trail would not adversely impact the Hawaiian hoary bat and its roosting habit, because the trail route will avoid impacting trees.

No rare, threatened or endangered invertebrates are known from the area. No streams or lakes are present, and thus there is no aquatic fauna.

Annual bird surveys are conducted by DOFAW on the southwestern slope of Mauna Kea from treeline to the lower forest reserve boundary. From these surveys and casual observation, the project site is known to have a mix of native and alien species. Key species in this area include five endemic birds, the palila (*Loxioides bailleui*), Hawaiʻi ʻamakihi (*Hemignathus virens virens*), ʻapapane (*Himatione sanguinea*), ʻiʻiwi (*Vestiaria coccinea*) and the endemic *bryani* subspecies of Hawaiʻi ʻelepaio (*Chasiempis sandwichensis*), as well as alien house finches (*Carpodacus mexicanus*), Japanese white-eyes (*Zosterops japonicas*), Eurasian skylarks (*Alauda arvensis*), and numerous gamebirds.

Two other native bird species may also use the area, though neither is known to breed here. The pueo, or Hawaiian short-eared owl (*Asio flammeus sandwichensis*), is an endemic sub-species of the widely distributed short-eared owl, and is found in the grasslands of Hawai'i Island. In addition, the endangered 'io, or Hawaiian hawk (*Buteo solitarius*), which is commonly seen in forested areas of Hawai'i Island, is also occasionally observed soaring in the general area.

The most prominent and important native bird at the site, as well as the key theme of the proposed Palila Forest Discovery Trail, is the palila, which merits further discussion.

The palila was listed by the USFWS as endangered in 1967 (USFWS 1967) and critical habitat was designated in 1977 (USFWS 1977). The area designated as critical habitat encircles Mauna Kea from about 5,500 feet in elevation to 10,000 feet in elevation, encompassing an area of 24,357 ha (hectares). The project site is within critical habitat, on the edge of the core range of this bird. The māmane/naio forests in this area contain over 95% of its population (Camp and Banko 2012). The palila is the last extant representative of the finch-billed clade of Hawaiian Honeycreepers (Drepanidae) found on the main Hawaiian Islands. While fossil evidence shows that the species was formerly widespread on multiple islands at all elevations (Olson and James 1982), historically the species has been restricted to the māmane-naio forests at high elevation on Hawai'i Island. Over the 20th century, palila disappeared from its historic range on Mauna Loa, Hualālai, and most of Mauna Kea, with the remaining population undergoing a steady decline over the past decade (Leonard et al 2008, Camp and Banko 2012). The most recent published estimate shows that about 2,070 palila survive in degraded forest on the southwestern slope of Mauna Kea (Camp et al 2014).

Palila have evolved an extremely specialized diet dependent on māmane trees and associated invertebrates for their survival. Few other birds in the world are so highly specialized in their diet, and therefore, their habitat requirements. Māmane seeds and flowers must be available throughout the year in order to sustain palila populations, as approximately 90 percent of their diet is derived from these trees. Insects provide additional protein for growth and survival of the young, with caterpillars serving as the chief insect prey items of palila. Most of the caterpillars consumed are found within māmane pods. Breeding effort (number of pairs attempting to nest) and success (number of fledglings produced) of palila depend heavily on the availability of māmane seeds and supplemental insect foods.

Large māmane trees can produce many more resources (seeds, flowers, insects, nest sites) than small trees and are preferred by palila. Elevational and rainfall gradients result in food resources being available to palila in relatively large quantities throughout the year. Where elevation and rainfall gradients are substantial, māmane flowers (and the seeds that follow) are produced in large quantities at higher elevations first (where rainfall is higher) and at lower elevations later (where rainfall is lower). Palila respond to this changing availability of food by moving up and down the mountain, following the available food resources. Where elevation and rainfall gradients are insignificant, māmane seeds and flowers are produced in large quantities usually only once a year and are relatively scarce the rest of the year. Therefore, habitats best able to sustain palila in the long term are large areas of forest that contain dense stands of large māmane trees and incorporate significant elevational or rainfall gradients. Habitat restoration is ongoing in the Ka'ohe Restoration Area, as well as at Pu'u Mali Restoration Area on the north slope of Mauna Kea, both of which were created from the

withdrawal of grazing leases as part of mitigation for the Saddle Road Improvements project (FHWA-CFLHD 1999).

Recent palila occurrence at the project site can be inferred based on annual surveys conducted by DOFAW. Annually, 13 transects are surveyed within the core habitat of the palila. The closest stations are on transect 125 and 126, with the bottom three stations of transect 125 (26-28) approaching within 700 feet of the site. Palila numbers over the last 14 years of surveys range from 1-10 total at these stations, indicating a low density in the area. This site is at the very edge of the core area populated by the palila.

While the trail lies within areas designated as Palila Critical Habitat, the proposed project footprint would affect critical habitat of the palila only very slightly. Moreover, the project will provide a net benefit to this as well as other native species over the long-term by providing an appropriate area for the public to engage with this native resource while at the same time protecting it. As a mitigation measure, only manual labor not involving small engines will be used during the palila breeding and fledging season (June - August). This parallels guidance by USFWS to DLNR to avoid low helicopter flights during that period.

3.1.4 Air Quality, Noise and Scenic Resources

Environmental Setting

The strong and steady winds of the project site, which is located at elevations on Mauna Kea just above the semi-persistent tradewind inversion, assist in maintaining excellent air quality by generally dispersing human-derived pollutants as well as volcano-induced vog. In nearby areas with bare surfaces, however, the strong winds may also generate dust, especially in areas disturbed by grading, fire or over-grazing.

Sound levels on the project site is low, reflecting natural sources such as wind and bird song, with only very occasional noise from passing 4WD vehicles and helicopters. No noise-sensitive human receptors are present, but the low noise levels contribute to the area's value for palila habitat, as discussed above.

The project site's forested vegetation is scenic in and of itself, and the proposed trail route has several natural lookouts that afford spectacular views to the south and west, particularly on the spur of the trail that extends to the summit of Pu'u Lā'au, perched on a slope above the ranchlands of Kohala. However, the project site is not specifically identified in the Hawai'i County General Plan as an area of notable natural beauty.

Impacts and Mitigation Measures

The proposed action will not measurably affect air quality except minimally during construction activities. In order to avoid impacts from dust, MKFRP personnel and their partners will minimize the amount of disturbed area at any given time and will avoid ground disturbance during high winds. The use of the trail should generate only insignificant amounts of dust.

Trail construction and occasional maintenance will involve chainsaws and weedeaters. These activities will take place in an isolated areas and are not expected to generate perceptible noise at the boundaries of the subject property, and no human noise-sensitive receptors would be affected. Noise impacts to the endangered palila and mitigation to avoid them are discussed in the previous section.

Neither construction activity nor use of the trail on the project site would be visible from any major public vantages, and no important viewplanes or scenic sites recognized in the Hawai'i County General Plan would be affected by the project. Scenic vistas would be enhanced by the additional viewpoints offered by the trail and the opportunity to enjoy these views in a pristine setting.

3.1.5 Hazardous Substances, Toxic Waste and Hazardous Conditions

Environmental Setting, Impacts and Mitigation Measures

No systematic, professional evaluation such as a Phase I Environmental Site Assessment (ESA) was performed for the project site. To MKFRP officials' knowledge, there have been no spills or other incidents involving hazardous or toxic substances, and no such materials are stored on or near the proposed trail. The construction and use of the Palila Forest Discovery Trail do not pose any unreasonable risk in terms of worker or public exposure to such materials.

3.1.6 Wildfire

Existing Environment

In modern times, wildfire has come to pose a grave threat to Hawaiian ecosystems by converting native habitats into grasslands or shrublands dominated by nonnative species (Cuddihy and Stone 1990). Fires in Hawai'i are usually caused by human activity. Unlike many other areas in the world, the majority of dryland native Hawaiian plants are not adapted to wildfires, and they generally perish when exposed to fire. Native shrubs and trees may recover from fire to some degree, but native plant communities are often overwhelmed by more aggressive alien species after fires. Many nonnative species are pyrophytic (adapted to fire) and thrive in the aftermath of wildfires. Unlike native shrubs and trees, many alien grasses recover quickly, increasing in ground cover and biomass after a fire. Fires encourage non-native grass by stimulating growth from the base of clumps and encouraging seed production. The establishment of pyrophytic grasses increases the threat of additional fires. Two-thirds of the dry forests of the Big Island have been lost, primarily due to wildfire carried by invasive grasses (HWMO 2007). Wildfires furthermore may lead to injuries and death to people and wildlife, as well as property losses and soil erosion, with consequent impacts to water and air quality.

Fire represents a major disturbance in much of northwest Hawai'i, including the Ka'ohe GMA and adjacent portions of the Mauna Kea Forest Reserve where the proposed trail is located. Maps of wildfires from 1954-2005 compiled by the Hawaii Wildfire Management Organization show that most of the non-bare lava surface between Waimea and Pu'uwa'awa'a has burned, much of it multiple times (HWMO 2007). Dangerous wildfires have affected the southern part of Mauna Kea as recently as

2003, when a large fire burned in the Ka'ohe GMA, and October 2011, when 1,200 acres burned east of Mauna Kea State Park, and Saddle Road had to be closed.

What makes fire potentially devastating in the Mauna Kea Forest Reserve, Ka'ohe GMA and adjacent areas is the value of the existing habitat. The intact māmane/naio forest, valued and protected by ancient Hawaiians, 19th century ranchers, territorial foresters and current wildlife agencies, is in the crosshairs of wildfire. As discussed in detail above, the only habitats able to sustain the endangered palila over the long term are large areas of forest found here that contain dense stands of large māmane trees and incorporate significant elevational or rainfall gradients to provide year-round food sources.

Impacts and Mitigation Measures

Any new use in the Forest Reserve adds the potential for wildfire starts. To reduce fire risk, the parking area will be mowed frequently to prevent hot car exhaust systems from igniting tall grass. Fire prevention signage will also be installed at the trail head to remind users of the dangers of fire. These Best Management Practices are already employed on roads and parking areas within the Ka'ohe Game Management area during bird hunting season.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics and Recreational Uses

Environmental Setting

The project involves and benefits recreational use within the native vegetation of leeward Mauna Kea, and thus the community of hunters, birders, hikers and others from the Big Island and elsewhere who enjoy this resource. The 2010 U.S. Census of Population counted 185,079 residents on the Big Island, with a very diverse ethnic mix of 33.7% White, 22.2% Asian, 12.1% Native Hawaiian or Pacific Islanders, and 29.5% with two or more races. With 14.5% over 65 years old (compared to about 14% for the State as a whole), and a median age of 41.5 years (compared to 38.6 for the State), the population is skewed towards the older adults and the elderly. Many younger working-age residents who grow up in Hawai'i County relocate to other islands or states to find work. Nevertheless, since 1980, Hawai'i County has consistently been among the 100 fastest-growing counties in the U.S., mainly because it attracts working age adults or retirees, particularly in the Puna, Kohala and Kona districts.

Key wildlife-related recreational activities in the project area include hunting, wildlife viewing and hiking. Hunting is very popular in the area, and a 2006 survey of recreationalists in Hawai'i found that 18,000 residents hunted in the previous year (USFWS-USCB 2006). Hunting of feral mammals and game birds is supported in the Ka'ohe GMA and in the adjacent Mauna Kea Forest Reserve. The Ka'ohe GMA is designated by DOFAW as Hunting Unit G, where wild pig, sheep and goats may be taken by archery only, with no dogs permitted. It is open year-round on weekends and holidays, and bag limits apply to pigs but not sheep or goats. Bird hunting in season according to regulations is also allowed.

Hawai'i has 34 endangered bird species that are among the objects of "life lists" for birders from around the world. The 2006 recreational survey estimated that 155,000 Hawai'i residents and 107,000 visitors engaged in wildlife viewing (USFWS and USCB 2006). The Ka'ohe area is one of the only places to see the endangered palila. Aside from hiking birders, other hikers sometimes utilize the main unpaved roads in the area or go off-road to enjoy the forest and views. This activity appears to be growing in popularity throughout the Saddle region, as the Daniel K. Inouye Highway affords more access and visibility. The Ka'ohe GMA is also traversed and/or utilized by recreational off-road vehicles, including motorcycles, 4WD trucks, and All-Terrain Vehicles (ATVs).

Impacts and Mitigation Measures

The project will benefit both birding and hiking by providing a trail that offers the opportunity to view palila and other forest birds and hike in an area with subtle but significant interpretive information that enriches the outdoor experience. It will not affect hunting or off-road vehicle use, nor will it have any other adverse socioeconomic impacts.

3.2.2 Cultural and Historic Resources

Methods

The trail was laid out by MKFRP personnel to maximize interpretive values while minimizing effects to wildlife, endangered plants and historic/cultural resources, including potential visual impacts on the historic Pu'u Lā'au Cabin. The site was preliminarily inspected for historic properties and cultural resources with the assistance of Sean Naleimaile of the DLNR-State Historic Preservation Division, who did not observe any sites but recommended an archaeological survey. An Archaeological Assessment Survey (AAS) that confirmed the absence of historic properties in the area to be affected was prepared by ASM Affiliates. It is attached as Appendix 2 and discussed in more detail at the end of this section.

For cultural resources and impacts, this EA has relied on the AAS historic research and consultation, as well as EA consultation by letter of individuals, agencies and organizations known to have knowledge of cultural resources and practices, plus published material concerning Mauna Kea and the Saddle region. This includes the comprehensive work by Kepā Maly and Onaona Maly of Kumu Pono Associates documenting historical accounts and oral histories related to Mauna Kea and the mountain lands, or 'āina mauna (Kumu Pono Associates 2005). Also critical was a Cultural Impact Assessment (CIA) by Pualani Kanaka'ole Kanahele and Edward Kanahele of the Edith Kanakaole Foundation, along with a study of Traditional Cultural Properties (TCPs) by Dr. Charles Langlas, conducted as part of the Saddle Road Improvements Environmental Impact Statement (EIS) (FHWA-CFLHD 1999, Vols. IV and V). These studies provide a thorough assessment of the cultural background and values in the Saddle between Mauna Kea and Mauna Loa. They included extensive archival research, interpretation of chants and mele, and interviews with Hawaiian Home Lands homesteaders and others. Most of the cultural background information in this EA is derived directly from these three documents,

findings of which are paraphrased below and referenced where important for clarification or attribution.

Cultural Background and Importance of 'Aina Mauna Area

The project site is located in the Hāmākua Moku (district) of Hawai'i Island in the *ahupua'a* (traditional Hawaiian land division) of Ka'ohe, which translates to "the bamboo" (Pukui et al. 1974:85). The project site is on the slopes of Mauna Kea, a mountain with great cultural significance, in an area that is also strongly associated with Hawai'i's history of ranching.

The high elevation areas of the island are considered to have religious importance to Native Hawaiians. Place names reflect the relationship of this area of concern with the indigenous people, their philosophy of life, and their gods.

According to work by the Edith Kanaka'ole Foundation, *Lono-nui-akea* was the original name for the Island of Hawai'i. It is the sacred name of Lono, the god of stormy weather, dark clouds, and rain. Throughout Polynesia, two islands were honored as *Ka inoa akua* (the god name, or namesake), and the Island of Hawai'i was one of these.

The popular interpretation of Mauna Kea is "white mountain." Mauna Kea is known around the world, and is regarded by many as the highest island mountain, the highest mountain in the world from below sea level, and the best mountain from which to make astronomical observations. To the Native Hawaiian, Mauna Kea, now often spelled with one word as Maunakea, is a *kupuna*, a grandparent or ancestor, and an *one hanau*, birthplace or home, and its name may more properly relate to Wakea, the Sky Father.

In the words of Pualani Kanaka'ole Kanahele and Edward Kanahele:

> "Wakea and Papa are the original parents of native Hawaiians. Mythologically they are the marriage of sky and earth: Wakea, Sky Father and Papa, Earth Mother. Between the two all things were born. Mauna Kea is the *piko* (center of a beginning or ending) of the island. This piko is the initial provider of the land mass of Hawai'i mokupuni. Hawai'i was also the *hiapo*, or first island child, of Papa and Wakea. The responsibilities and resources of Hawai'i and Wakea are needed for the growth and well-being of the island and all living forms of this mokupuni.
>
> The *kalo* (taro, a staple food) was Wakea and Papa's first food child and regarded as an elder brother who fed all indigenous natives, or *kanaka maoli* from the beginning of time today. During the time of *ali'i* (chiefs, elite of the society) it was important for them to trace genealogy to the kalo and eventually to Wakea and Papa. When the genealogy could prove the connection they received the status of the senior line or hiapo line. Mauna Kea falls in the senior line genealogy.

The Wakea and Papa beliefs and practices, including the tribute and respect for hiapo and kupuna, extend to contemporary times. Ancestral memory reminds the native Hawaiian that the mountain, like their parents, is the well-spring and provider of physical and spiritual nourishment.

Strands of information from the past are found today in songs and people's actions. Besides land, water is a vital element of life and living. The high mountains attract clouds, then the clouds shed their water and the water soaks into the earth.

The Pohakuloa area has Lilinoe as the female deity of misty rain and heavy fog, while Poliahu is the snow deity which adorns the top of Mauna Kea during the winter. These male and female water forms both belong to the Mauna Kea area.

The ancestors of Native Hawaiians were island people and used the ocean to travel from island to island. Due to the vastness of the ocean and the limited land base, the measurement for survival was the ability to acquire food. Resources for the acquisition of food included the reef, fresh water, and fertile soil. The Hawaiian moon calendar was devised to assist Hawaiians in gathering and planting on fortuitous days. Using the moon calendar, the forefathers calculated the established cycles of all life forms. It was based on many generations of observation and practice, and it proved successful.

Other forms of traditional literature condone the fact that the ancestors made an effort to understand the intricacy of relationships of diverse life forms. One of the reasons for this was to protect and help sustain the food sources. They recognized a hierarchical order as well as a system of harmony and interaction of all existing life forms known to them.

They observed and made critical analyses of their sky, land, and ocean spaces. Rain, ocean, clouds, wind movement, coral species of the ocean, and seeded plants of the uplands are referred to within a common bond for generating regrowth or as a food source. Kane was responsible for regeneration, and the ocean currents, rain, wind, and clouds move together to make this possible. For food systems to regenerate themselves, the sky, land, and ocean spaces unite in a harmonic and natural rhythm to maintain the currents of water particles and clean air. This movement is known as *lokahi*. Lokahi is a system of working in unity and harmony. This knowledge was passed on through protocol, cultural practices, songs, and stories.

Lokahi is the antithesis of hierarchy. Lokahi is the system which bypasses the *hiapo* system and does not give precedence to first born or senior line. It is the system which states that everything is equal because everything, no matter how small or large, has a function which is necessary to maintain the overall well being of the whole entity. Native Hawaiian ancestors lived within these two systems and measured everything by this frame of reference.

One example is the division of ocean, sky, and land. These spaces were divided horizontally and vertically. The land division would be of primary concern for the proposed project. The most familiar is the vertical divisions, or *moku* and *ahupua'a* sections common to maps of

today. The boundary lines run from mountains to the ocean. The vertical boundaries followed mountains, rivers, streams, and cinder cones.

The natural vegetation growth was the measuring device for the horizontal pattern of the second land division. For this division, vegetation growth dictated land division name changes. The forest, like the coral bed, is the food source and therefore a vital system for the continuum of life and life cycles. The trees house food for birds, insects, animals, and man, and produce seeds for regeneration. The forest provides vegetation used for medicinal purposes, spiritual adornment, housing construction, and many other items. The following information identifies the horizontal space and the kinds of flora typical to each of these horizontal land areas.

Kuahiwi. Kuahiwi means the mountain top, the backbone of the island, which is too high in elevation for heavy vegetation to grow. It is a very important area because of its height.

Kualono. Kualono is the region near the mountain top. Little vegetation grows in this area. The māmane and naio are the only hardy trees to grow at this height. Both of these are hardwood trees. The flower of the māmane was a specialty for the ali'i because of its shape and yellow color. When he wanted a special lei he would send his runners to fetch māmane flowers. 'A'ali'i can also be found at this height. [The trail project site is within the Kualono.]

Waoma'ukele. Waoma'ukele is the region named for the wet, soggy ground. This area was located in the rain belt of the island, especially on the ko'olau side of each island. The typical trees of this area are the very large koa, 'ohi'a, varieties of lobelia, and māmane.

Waoakua. Waoakua is the forested region below the waoma'ukele. This area is said to be occupied by spirits of the forest. Man seldom ventured into this area during ancestral times except when a particular kind of tree was needed and could not be found elsewhere. The large trees acquired from the waoakua and the waoma'ukele deserved substantial offerings. This is the region where the forest had a greater variety of trees. Some of the trees found are kolea, ho'awa, kopiko, maile, maua, alani, koa, and 'ohi'a.

Waokanaka. Waokanaka is the forested region *makai* (toward the sea) of the waoakua. This area was frequented by native Hawaiians. They found wood and other materials for weapons, house construction, tools, surfboards, and canoe accessories. They harvested dye, collected medicine, collected bird feathers, gathered vegetation for leis, gathered vegetation for the kuahu, gathered material for making rope, and many other useful things for everyday living. The trees in the waoakua are also found in this area, but the trees of this area may be smaller. Other flora found in this area include pilo, hapu'u, holei, papala, hau kuahiwi, palapalai 'olapa, and mamaki.

Kula. Kula referred to the upland grassy plains. The plants of the kula included 'ilima, ma'o, 'ama'u, 'a'ali'i, 'uluhe, and pili.

Kahakai. Kahakai referred to the edge of the ocean. At the kahakai was found the niu, hala, kaunaoa, kamani, hau, milo, naupaka, lama, and alahe'e. All plants were recognized as useful to the Hawaiian" (FHWA-CFLHD 1998, Vols. IV and V).

In evaluating the effects of the Saddle Road Improvements project, which occupied many of the zones listed above, the Edith Kanakaole Foundation identified these resources and concepts as of sufficient importance to potentially affect the quality of life for native Hawaiians and their relationship to the environment and land.

- Importance of vegetation and the identity of the land sections.
- High cultural value of older or larger trees and *kipuka* which normally housed older trees.
- Priority to promote new growth through the non-disturbance of seed-producing forest areas within the *waoma 'ukele* and *waoakua*. Hawaiians did not penetrate these areas if the trees they needed were available elsewhere.
- Importance of food source and regenerative energy of the forest.
- Philosophy of "a life for a life." When it was necessary to cut a large tree from the high forest, an offering of a human sacrifice was made.
- Importance of the *waoma 'ukele* as a good source of water, and for maintaining the richness of the rainforest.

Again, quoting Pualani Kanaka'ole Kanahele and Edward Kanahele:

> "Native Hawaiians are people whose daily lives and culture are rooted in and integrated with the surrounding natural and biological world. They recognized and practiced respect for hierarchy or hiapo for man and land alike. The mountain is the sacred child of Wakea, and it is the source for the land. The mountains and land were genealogically connected to native Hawaiians through the original ancestor, Wakea and Papa. The mountains or land, water, and sky were a necessary part of the life cycle. The taro was regarded as an older brother of the land and provided sustenance. The coral was also an older brother (of the sea) and was the means through which other food could be acquired. The hierarchical system assigns rank to man, god, and the elements of the environment. Within the hierarchical food system another set of rules apply. The older or larger trees are primary and most important. The other animals that use these trees as their residence or food source are secondary.
>
> The lokahi system complements and maintains the wellbeing of the whole entity. Everything is important because each has a function.
>
> Water was and is necessary for all life forms. Laws for water and the use of water were formulated so all had exposure to water. Water that did not touch ground was highly prized. Such as the water in the lake on Mauna Kea and the water in the piko of the taro leaf. Water that moved underground or over land from the mountain to the sea was sometimes funneled

into irrigation channels and fed the older brother kalo and was also treasured. The mountain and the waoma'ukele attracted the atmospheric water" (FHWA-CFLHD 1998, Vols. IV and V).

Historical Background

According to the radiocarbon dating and oral traditions recently summarized by Kirch (2012), the settlement of Hawai'i occurred roughly a millennium ago, with colonists possibly from the southern Marquesas Islands. Early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Order was kept through adherence to their ancient and ingrained philosophy of life and through the principle of genealogical seniority. Hawaiians brought from their homeland a variety of Polynesian customs including the major gods of Kane, Ku and Lono; the *kapu* system of law and order; *pu'uhonua* or places of refuge or asylum; the *'aumakua* concept of a family or ancestral spirit and the concept of *mana*, or spiritual power. A time of periodic two-way voyaging followed for the next four centuries, which also brought changes that included an evolution of traditional tools as well as some distinctly Hawaiian inventions. The evolution of the adze was an example of the former, while the latter included the two-piece fishhook and the octopus-lure breadloaf sinker. Another invention was the *lei niho palaoa*, an item worn by those of high rank which represented a trend toward greater status differentiation.

The period of roughly 1400 to 1650 A.D. was a time of increasing in social stratification and major land use changes associated with institution of the *ahupua'a* system, where each *moku* was divided into radial segments each offering the variety of resources found in each elevational zone, from coral reefs to rainforests. Land became intensively managed by the paramount chiefs and subordinates in a hierarchical system, and the common people, or *maka'ainana*, no longer were organized into groups associated with a particular piece of land, as in their ancestral homes in Polynesia. It also was a time of expansive settling, with the development of the most favorable windward areas as well as more marginal areas on the island's leeward side. This was the time of the greatest population growth as large irrigated field systems were developed and expanded into more arid areas. *Loko* or fishpond aquaculture also flourished during this period.

An increase in war marked the Proto-Historic Period (A.D. 1650-1795), both locally and between islands. Some of that warfare involved the lower slopes of Mauna Kea and strategically important *pu'u* near Waimea.

Hawai'i's history took a sharp turn on January 18, 1778 with the arrival of British Capt. James Cook in the islands. On a return trip to Hawai'i 10 months later, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai'i Island. Cook exchanged gifts with Kalaniopu'u at Kealakekua Bay the following January, and Cook left Kealakekua in February. However, Cook's ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

Two American vessels visited Hawaiian waters in 1790. The crew of one of the ships, the *Eleanor*, massacred more than 100 Hawaiians at Olowalu on Maui before leaving crewmember John Young on

land. The other vessel, the *Fair American*, was captured off the western coast of Hawai'i and its entire crew – with the exception of Isaac Davis – was killed. Kamehameha did not take part but kept the *Fair American* as part of his fleet. Young eventually made his way to Hawai'i Island where he became governor, living at Kawaihae. By 1796, gaining critical knowledge from the captured sailors, Kamehameha had conquered every island kingdom except Kauai, but it wasn't until 1810, after Kaumuali'i of Kauai pledged his allegiance to Kamehameha, that all of the Hawaiian Islands were unified under a single ruler.

During this period there was a continuation of the trend toward intensification of agriculture, *ali'i*-controlled aquaculture, settling of upland areas and development of traditional of oral history. The Ku cult, *luakini heiau* and *kapu* system were at their peaks, but the influence of western civilization was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier was flourishing. That contributed to the breakdown of the traditional subsidence system, as farmers and fishermen were required to toil at logging which resulted in food shortages and a decline in population.

Following the death of Kamehameha I in 1819, the customary relaxing of *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of *'aumakua* images was allowed to continue.

The Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions, as many of the *ali'i* were eager to assimilate western-style dress and culture. But at the same time, the continuing sandalwood trade was becoming a heavier burden on commoners, as Ellis noted:

> "About eleven at night we reached Towaihae [Kawaihae], where we were kindly received by Mr. Young. ... Before daylight on the 22nd, we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts."

The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of Western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price. In the Waimea area and other uplands, cattle ranching became king.

The cattle brought by Captain Vancouver in 1793 and 1794, protected by a *kapu* placed on them by Kamehameha, multiplied rapidly. By the time the *kapu* was lifted a few years later, wild cattle had

become rampant throughout the island, disturbing native gardens and damaging streams, grasslands and forests. Foreign bullock hunters were then employed to keep the herds under control. Although the meat was eaten, the main economic products were the hides. John Parker worked for Governor Kuakini as a bullock hunter in 1831, and before long had founded the famous ranch that still bears his name. By 1847, as Reverend Lorenzo Lyons noted, "two thirds of Waimea has been converted into a government pasture land" (IARII 1997:19). Stone walls were erected around residential settlements and cultivation fields as barriers to prevent damage by cattle. Cattle ranching profoundly changed life by displacing native agriculture, firmly establishing a monetary economy, altering the landscape and forests through direct and indirect means, and bringing in foreigners. Parker Ranch has been a major factor in shaping the natural and cultural landscape of Kohala and parts of Hamakua, including Ka'ohe. Workers here and at other ranches generated a unique set of cultural practices and traditions known locally as the *paniolo* (Hawaiian for "Spanish" or "Español") culture.

The Mahele 'Aina that took place in 1848 placed all land in Hawai'i into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were "subject to the rights of the native tenants," or those individuals who lived on the land and worked it for their subsistence and for their chiefs. In the Mahele, the vast *ahupua'a* of Ka'ohe was relinquished by Victoria Kamamalu to Kamehameha III on January 27, 1848 (Buke Mahele 1848:5-6). It was then given by Kamehameha III to the Government Land Inventory on March 8, 1848 (BM:1848:191). There were only four native claims registered, and one awarded, none in the *'āina mauna.*

Official leases of the area of Ka'ohe that include the project site began in 1857 (Keoni Ana to Francis Spencer) for Spencer's Waimea Grazing and Agricultural Company. The lease included all of the mountain lands. Eventually, Parker Ranch obtained the lease and kept it until 1905, when part of the area was withdrawn for the Mauna Kea Forest Reserve. The project site remained within leased land.

One of the interesting and culturally significant events that occurred in the specific Pu'u La'au area somewhere near the project site was the 1882 passage of the Dowager Queen Emma, on her way to a ceremonial bath in Lake Waiau. It was recounted in the native newspaper *Kuokoa* on October 14, 1882, which was translated in by Kumu Pono Associates (2005:155). *Mele* celebrating the trip were written and are in the B.P. Bishop Museum collection. In the translation by Mary Kawena Pukui and others, there are references to the Queen enjoying "the sweet voices of the Palila." (Ibid: A155). In an interview of Kalani Ka'apuni-Phillips by Larry Kimura from 1967, transcribed by Kepā Maly, he said concerning the Queen's journey from Waimea:

> "Queen Emma was a good horsewoman....she could choose which ever horse she was interested in. Waimea had many horses to choose from. They went up to this place called Kahalala'au (Pu'u Lā'au)....At that time, there was great rain, and no shelter. So these people with your renowned elder, they broke the leafing branches of the māmane. They made a house for Queen Emma. This work of your elder and the people with him brought him honor. When this house was made for Queen Emma, Queen Emma said to your grandfather, William Lindsey, 'In living with your wife, if she should give birth.....Name the child, Ka-hale-lau-māmane' " (Ibid:161).

The māmane forest was clearly an important attribute of the area, with both cultural and natural significance. An 1892 account of a Mauna Kea survey trip by W.D. Alexander in the Honolulu Commercial Advertiser noted that Waiki'i was excellent grazing country (i.e., mostly grass), but that a fine grove of māmane trees still survived at Auwaiakeakua Gulch, which runs just north of Pu'u La'au (Ibid:182).

The value of the māmane forest for both commercial (e.g., fence posts) and watershed purposes was increasingly recognized in the later kingdom, Republic of Hawai'i and early Territorial days. In an October 13, 1906 report of Territorial Forester Ralph Hosmer, there was a recommendation to remove certain portions of Ka'ohe for sale or lease, as "waste land", because it was good māmane forest land that was not particularly suited for grazing. It had traditionally been provided "*manuahi*" (gratis), Hosmer said, and it would make more sense to simply reserve it and protect the forest. He proposed a line extending clockwise from Ahumoa to Pu'u La'au to the Pa'auhau boundary over to Kemole, on which a cattle and sheep-proof fence would be built. The manager of Parker Ranch, Alfred A. Carter, was in agreement (Ibid:433, 542).

In 1909, part of the Ka'ohe pasture lease land was withdrawn to create a portion of the Mauna Kea Forest Reserve (Ibid A15). Additional land was withdrawn from Ka'ohe in 1956 for the U.S. Army's Pohakuloa Training Area (Governor's Executive Order No. 1719, Presidential Executive Order No. 1167) (Ibid:15).

It would be some years before a fence completely encircled the mountain and cattle and sheep were removed from the Mauna Kea Forest Reserve. Famed Territorial Forester L.W. (Bill) Bryan wrote several articles in 1937 in the *Paradise of the Pacific* magazine ("Wild Sheep of Hawaii" and "The Big Fence on the Big Island") documenting the process. He wrote of the considerable damage that wild sheep and goats had done to native forest cover, especially māmane. In 1935, the U.S. Government began to assist the Territory of Hawai'i through the Civilian Conservation Corps (CCC), and they built a sheep proof fence around the entire reserve and its 100,000 acres at roughly the 8,000-foot contour, and then killed or captured almost 16,000 wild animals. The 55.5-mile long, 55-inch high, extra heavy galvanized stock wire fence was completed in January of 1937 at cost of $72,000, or $1,300 per mile, and utilized māmane posts. (Kumu Pono Associates 2005:239-41). Rally Greenwell, who worked as a *paniolo* all over Parker Ranch and eventually became Ranch Manager, recounted to Kepā Maly in a 2000 interview that Bill Bryan planted the conifers that now grace the Pu'u La'au area (Ibid: A68). He indicated that the cowboys did not generally travel beyond the fence line and that Parker Ranch helped Mr. Bryan maintain the fence. Other cowboys, including Jiro Yamaguchi in his interviews with Maly, said that some cowboys would occasionally *holoholo* up the west side of Mauna Kea from Pu'u La'au, although not to the summit (Ibid:A78).

The project site remained ranch land throughout much of the twentieth century, and eventually became part of the State-administered Ka'ohe Game Management Area, where hunting and bird watching are currently popular activities. In 2002, to compensate for the use of Palila Critical Habitat in the Saddle Road realignment, the DLNR and USFWS agreed to set aside two areas for palila habitat restoration. These areas included the Pu'u Mali Restoration Area (5,140 acres) on the northern slope of Mauna Kea and the Ka'ohe Restoration Area (1,400 acres) on the southwestern slope, where the project site is

located. The Mauna Kea Forest Restoration Project (MKFRP) was initiated in 2006 when funding was obtained to support staff and management efforts. The goal of the project is to facilitate management that benefits palila at the Pu'u Mali and Ka'ohe Restoration areas and on other lands in Palila Critical Habitat. The proposed Palila Forest Discovery Trail is one aspect of this restoration project.

Cultural Resources and Practices on the Project Site

Although the summit regions are particularly sacred, Mauna Kea, from the lower slopes to the highest peaks, is culturally significant. Other landmarks in the vicinity of the project site are Ka Pu'u-a-Pele, the top of which marks the joining of the *'apana* of Kona, Kohala, and Hamakua; Ahumoa, another cinder cone; and Pu'u La'au, which is associated with the thriving māmane forest and Queen Emma's visit. In general terms, resources of high importance in the Saddle area that were determined by the Edith Kanaka'ole Foundation to be important were the māmane forest, *kipuka*, prehistoric trails, and historic trails. The cultural value of māmane/naio forest and *kipuka* is associated with the age and size of the trees. Interestingly, the Waimea Hawaiian Civic Club introduced a resolution in 1980 at the 1979 Association of Hawaiian Civic Clubs convention on Maui to protect Mauna Kea. Among other items was a request to have the entire māmane/naio forest fenced off, for the purpose of preserving the habitat of the threatened and endangered palila (Ibid:638).

Although strictly speaking, ranching may not constitute a traditional cultural practice, it is certainly the foundation of the current culture, lifestyle and identity of the Parker Ranch and adjacent areas. The *paniolo*, many but not all of whom are Hawaiian, form a unique subculture that reflects a combination of both its Hawaiian and western roots. The older, and certainly the original, residents of Kuhio Village and Pu'ukapu are very much a part of this *paniolo* subculture. To some extent the ethnic traditions of other cultures have been incorporated into the general cultural milieu of Waimea and Waiki'i and are celebrated by all, with periodic events including cowboy-oriented falsetto and storytelling events, parades and historical festivals sponsored by local schools.

Similarly, hunting, discussed in the section above, is a recreational or subsistence practice with cultural importance as well, as generations of families have utilized the introduced mammals and birds and enjoyed the outdoors. Furthermore, it can be argued that the enjoyment of nature exemplified by hiking and birding reflects a cultural practice of honoring and respecting nature.

To summarize the cultural resources and practices present on the project site, they focus on the māmane forest, which is culturally important. The trail has been designed to avoid removing māmane trees and even minimize the need to trim them, although some trimming will be necessary. The Ka'ohe Game Management Area no longer supports ranching but is important for hunting. The trail lacks any archaeological remains.

Impacts and Mitigation Measures

The Constitution of the State of Hawai'i clearly states the duty of the State and its agencies to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for

subsistence, cultural and religious purposes and possessed by *ahupua'a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the people's traditional right to subsistence. As a result, in 1850 the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua'a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawai'i Revised Statutes (HRS) 7-1. In 1992, the State of Hawai'i Supreme Court reaffirmed HRS 7-1 and expanded it to include:

> "native Hawaiian rights...may extend beyond the ahupua'a in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawai'i in 2000, relating to Environmental Impact Statements, stated that:

> "...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights... "[H.B. NO. 2895].

The proposed Palila Forest Discovery Trail would be contained within māmane forest, which it is expressly intended to honor, perpetuate and enjoy. No māmane trees would need to be cut, and any trimming would be minor. The project does not restrict hunting, ranching, nature enjoyment or other modern cultural activities. The proposed project would not likely impact any culturally valued resources or cultural practices. SHPD, the Office of Hawaiian Affairs, and various cultural experts contacted as part of early consultation were supplied a copy of the EA for their comments. OHA provided a review letter (see Appendix 1b) in which it supported the purpose of the project and did not provide any additional cultural information or express concerns about cultural impacts. No other party reviewing the Draft EA supplied any cultural information.

As discussed above, the archaeological assessment survey was conducted by ASM Affiliates. Fieldwork consisted of a pedestrian survey of the proposed Palila Forest Discovery trail route, the adjacent, grassy forest restoration areas, and the previously graded parking and future compositing toilet/picnic shelter site. The archaeological survey was conducted on January 12, 2016 under the direction of Robert B. Rechtman, Ph.D., by ASM Senior Archaeologist, Matthew R. Clark, B.A. During the fieldwork the surface of the entire study area, was examined for extant archaeological remains, but none were encountered.

On the adjoining parcel (TMK: (3) 4-4-015:001) to the east of the project site is the Pu'u Lā'au Ranger Cabin built by the CCC during the mid-1930s was noted and inspected (see Figure 12 of Appendix 2). The two-room, post and pier cabin includes an adjacent wooden water tank and a nearby outhouse structure, with a memorial plaque from 1967 nearby. It should be noted that current visitors to this area, including hikers, hunters, birders and conservation workers, can and often do park nearby and rest on the steps of the cabin or wander inside. However, in

an effort to maintain the integrity of the historic setting, none of the structures associated with the trail will be visible from the cabin. The trail has been to direct hikers away rather than toward the cabin.

The AAS determined that no archaeological resources are present at the project site, and that the historic property of the Pu'u Lā'au Ranger Cabin, situated to the east of the project site, would not be affected by the proposed action. The installation of a composting toilet for various Pu'u Lā'au users would likely have positive impacts on the Historic structure, as visitors to the area would be less likely access the cabin for water or to use the outhouse.
Given these findings, the archaeologist concluded that that the proposed Palila Forest Discovery Trail will not affect any historic properties. With respect to the historic preservation review process of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD), the recommendation was that no further work needs to be conducted prior to or during project implementation. In the unlikely event that significant archaeological resources are discovered during the implementation of the trail project, DOFAW officials will ensure that work will cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

The AAS and these recommendations were provided to SHPD on February 8, 2016. The Final EA ~~was~~ expected to present the results of SHPD review and make a final conclusion concerning the potential to affect historic properties, and mitigation, if any, needed to minimize impacts. As of April 14, SHPD had not issued a review letter.

3.3 Infrastructure

Existing Facilities and Services, Impacts and Mitigation Measures

No electrical or telephone lines are present or required for the action. Although a fire diptank system is present directly adjacent to the parking lot, as discussed in Section 1.1, no potable water is available or needed for the project.

Currently there is a pit toilet at the Kilohana Hunter Checking Station, where all users must check in before driving to the trail or other Pu'u Lā'au locations. Although this facility adequately serves existing users of the Pu'u Lā'au area, depending on future funding availability, DOFAW intends to install composting toilets near the top of the trail in an area previously used as a gravel quarry. This would be used by all users of the Mauna Kea Forest Reserve and Ka'ohe Game Management Area, including hunters, birders, hikers and researchers.

Access to the site is from the Old Saddle Road, at the Kilohana Hunter Checking Station turnoff at the top of the "Seven Steps." Care is required to exit this driveway because of limited sight distance and the steepness of the unpaved driveway. This section of Saddle Road was bypassed when the realigned Saddle Road (now called the Daniel K. Inouye Highway) was opened in September 2013. The new highway greatly reduced traffic on the Old Saddle Road, alleviating concerns about turns into the Hunter Checking Station. From this checking station, visitors will travel up Road 1 (R-1), an unpaved road that serves the Division of Forestry and Wildlife in fulfilling its mission in recreation, fire-fighting and resource management in the Ka'ohe Game Management Area and the vast Ka'ohe section

of the Mauna Kea Forest Reserve. All vehicles utilizing this road must utilize 4WD, as signs at the entry to the road clearly indicate.

The proposed construction of the trail will involve primarily hand labor, which will mean that several trucks per day will be accessing the site for a period of about a week. After trail opening, MKRFP and DOFAW personnel envision an average of perhaps 5 to 8 vehicular visits per day (10 visitors total), which would be highest during good weather. Although this level of usage would not lead to significant deterioration of the road, which experiences a fair amount of traffic from hunters and other recreationalists, MKFRP and DOFAW maintain the roadway and it is understood that some additional maintenance will be required.

3.4 Secondary and Cumulative Impacts

3.4.1 Secondary Impacts

The proposed project would not involve major secondary impacts, such as population changes or effects on public facilities. Although the project would involve some very limited short-term construction labor, these minor services could be provided by MKFRP and its partners, using primarily volunteer labor, and would not induce in-migration.

3.4.2 Cumulative Impacts

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. The adverse effects of the project – minor and temporary noise and traffic, as well as permanent but minor visual impacts– are very limited in severity, nature and geographic scale. No construction or other projects involving an active land use are known to be occurring within a one-mile radius of the project site. However, several projects are taking place slightly further afield.

About one mile away is the boundary of the U.S. Army's Pohakuloa Training Area (PTA). In 2011, the U.S. Army published a Notice of Intent in the *Federal Register* that it plans to prepare a programmatic environmental impact statement (PEIS) to evaluate the impact of modernize training ranges, infrastructure, and support facilities at PTA. The project includes constructing and operating an Infantry Platoon Battle Area that would include an Infantry Platoon Battle Course, Live-fire Shoothouse, and a Military Operations on Urban Terrain facility. No aspect of the proposed expansion would interact in any adverse way with the proposed trail project.

About four miles southwest, also within PTA, a research exploratory well project is currently being drilled (UH Hawai'i Institute of Geophysics and Planetology 2012). This project will evaluate deep aquifers and assess the potential to develop this water resource for use by PTA, Hawaiian Home Lands and the Mauna Kea Observatories. This activity would not interact in any adverse way with the proposed trail.

Finally, a consortium of governments and institutions is planning the Thirty Meter Telescope (TMT), a large segmented mirror reflecting telescope to be built on the North Plateau of Mauna Kea (UHH 2010). Although stalled by legal battles that may ultimately lead to cancellation of the project, this billion dollar project, if approved, would be built starting in the last half of the current decade and would involve traffic and construction impacts, both on Mauna Kea and at support facilities in Hilo. It appears that none of the TMT activities would interact in any way with the proposed trail project.

In summary, the projects known to be occurring nearby will not generate impacts with which the very minor and temporary effects from the trial project would accumulate, and no cumulative impacts are foreseen.

3.5 Required Permits and Approvals

Aside from the Chapter 343, HRS, Finding of No Significant Impact and a finding of no effect to significant historic properties pursuant to Chapter 6e, HRS, no permits or approvals are expected to be required.

3.6 Consistency With Government Plans and Policies

3.6.1 Hawai'i State Plan

Adopted in 1978 and last revised in 1991 (Hawai'i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State's long-run growth and development activities. The three themes that express the basic purpose of the *Hawai'i State Plan* are individual and family self-sufficiency, social and economic mobility and community or social well-being. The proposed project would promote these goals by providing a recreational resource that would enhance quality-of-life and community and social well-being.

3.6.2 Hawai'i State Land Use Law, Forest Reserve and GMA Designations and Mauna Kea Plan

All land in the State of Hawai'i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 205, HRS. The project site is classified within the State Land Use Conservation District, Protective Subzone. Land uses in the Conservation District are regulated by the DLNR Office of Conservation and Coastal Lands (OCCL).

MKFRP and DOFAW officials have preliminarily determined that the proposed trail is consistent with the programs and current uses managed by DOFAW. The parcel was created under Executive Order #1398 on October 16, 1950 as a *State of Hawaii Public Hunting Ground and Game Reservation* and the adjacent *Mauna Kea Forest Reserve* was set aside under a Governors Proclamation on June 5, 1909, both of which are managed by the Hawai'i Island District office of the Division of Forestry and Wildlife. The *Mauna Kea Plan*, adopted by the BLNR on February 11, 1977, set the policy framework for the management of Mauna Kea, stating jurisdictional responsibilities for specific resources and

uses and defined specific uses and facilities to be allowed within the management areas. The proposed trail is within the "Māmane/Naio Forest Ecosystem" are designated by the plan. The plan specifically cited the following as one of its management objectives:

> Public use will be permitted in this area, including but not limited to hiking, riding horseback, use of fourwheel-drive vehicles in designated areas, hunting game birds, pigs, and other game animals, birdwatching, and visiting interpretive exhibits and day-use destination points.

It is the policy of DLNR that all divisions need to comply with Hawai'i Revised Statutes (HRS) §183C and HRS §343 and Hawai'i Administrative Rules (HAR) §13-5, and therefore each division is responsible for implementing procedures to comply with the aforementioned rules, statutes and plans, with which the proposed Palila Forest Discovery Trail is highly consistent.

As part of the EA review process, MKFRP and DOFAW sought concurrence from OCCL that the proposed use of the land for a trail would not require the applicant to submit a Conservation District Use Application (CDUA). In a letter of March 31, 2016 (see Appendix 1b), OCCL replied that the proposed project was a land use identified as P-8, STRUCTURES AND LAND USE, EXISTING (B-1), and P-9, STRUCTURES, ACCESSORY (B-1), requiring Site Plan Approval (SPA). As such, the Mauna Kea Forest Restoration Project will apply for Site Plan Approval upon completion of the EA.

3.6.3 Hawai'i County Zoning and General Plan

As the site is within the State Land Use Conservation District, County zoning per se does not apply. The County designates the site as Conservation in the General Plan Land Use Pattern Allocation Guide Map (LUPAG), and the action would be considered consistent with the LUPAG. The site is not within the Special Management Area, which is meant to protect coastal resources.

Still in the planning process, the Hamakua Community Development Plan has not yet been adopted by the County Council, but Community Objectives have been developed and adopted by the CDP Steering Committee. Reproduced in whole in Appendix 1b in the letter from the Hawai'i County Planning Department, these related to protecting natural and cultural resources and access to them, protecting agricultural lands, viewplanes, open space, and protecting and enhancing social diversity, cultural heritage, community infrastructure, collaborative management, employment and living options and appropriate rural tourism. The Palila Forest Discovery Trail is highly consistent with many of these objectives and inconsistent with none of them.

PART 4: DETERMINATION

Based on the findings above, and in consideration of comments received, the Hawai'i State Department of Land and Natural Resources has determined that the proposed project will not have any significant effect in the context of Chapter 343, Hawai'i Revised Statues and section 11-200-12 of the State Administrative Rules, and has issued a Finding of No Significant Impact (FONSI).

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, Hawai'i Administrative Rules, outlines those factors agencies must consider when determining whether an Action has significant effects:

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost, and the project would promote protection, interpretation and enjoyment of the forest resources.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed project expands and in no way curtails beneficial uses of the environment.
3. *The proposed project will not conflict with the State's long-term environmental policies.* The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project has a minor footprint, has been designed to avoid environmental impacts and fulfills aspects of these policies calling for protection and public enjoyment of the natural environment. It is thus consistent with all elements of the State's long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will benefit the economic and social welfare of the community by enhancing recreation protection.
5. *The proposed project does not substantially affect public health in any detrimental way.* The proposed project will benefit public health by promoting an outdoor recreation use.
6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected to result from the proposed action. The project will not enable development or cause in-migration.
7. *The proposed project will not involve a substantial degradation of environmental quality.* The project will not degrade the environment in any substantial way.
8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project is meant primarily to promote recreational enjoyment and awareness of the habitat for the endangered palila. Trail construction will be scheduled and conducted to minimize impacts to palila and other endangered birds. The area has been inspected by biologists from DOFAW/MKFRP and no endangered plant species is present.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is not related to additional activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.
10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* No adverse effects on these resources would occur. Ambient noise impacts due to construction will be extremely minor and timed to avoid impact to sensitive fauna, particularly palila.
11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the project is located in an area with seismic risk, the entire Island of Hawai'i shares this risk, and the project involves no structures other than kiosks and would not be imprudent to construct.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas or viewplanes identified in the Hawai'i County General Plan will be adversely affected by the project, and visual impacts will be negligible and/or beneficial, in that the project would provide good viewing points for hikers.
13. *The project will not require substantial energy consumption.* The project involves only minor energy use and no adverse effects are expected.

For the reasons above, the proposed action is not expected to have any significant effect in the context of Chapter 343, Hawai'i Revised Statues and section 11-200-12 of the State Administrative Rules.

REFERENCES

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ENVIRONMENTAL ASSESSMENT

Palila Forest Discovery Trail

APPENDIX 1a
Comments in Response to Early Consultation

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William P. Kenoi
Mayor

Darren J. Rosario
Fire Chief

Renwick J. Victorino
Deputy Fire Chief

County of Hawai'i
HAWAI'I FIRE DEPARTMENT
25 Aupuni Street • Suite 2501 • Hilo, Hawai'i 96720
(808) 932-2900 • Fax (808) 932-2928

January 19, 2016

Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawai'i 96721

Dear Mr. Ron Terry:

SUBJECT: Early Consultation on Environmental Assessment for Palila Forest Discovery Trail, TMK (3) 4-4-015:004

We are in receipt of your letter dated January 7, 2016 in regards to an early consultation on Environmental Assessment and Anticipated finding of no significant Impact for the above listed subject.

The Hawai'i Fire Department has no issues or comments with regards to the request for an early consultation on Environmental Assessment and Anticipated finding of no significant Impact as noted above.

If you should have any questions, please feel free to contact my office at (808)323-4761.

Mahalo,

DARREN J. ROSARIO
Fire Chief

KT/ds

Hawai'i County is an Equal Opportunity Provider and Employer.

From: Brandi Beaudet
Sent: Monday, January 25, 2016 10:29 AM
To: RON
Subject: RE: Early consultation letter for Palila Forest Discovery Trail

Aloha Ron – Thanks for the communication letter. Parker Ranch does not have any comments at this time to add to the EA. I would love access to the document once it's completed.

Mahalo,
Brandi

From: RON [mailto:rterry@hawaii.rr.com]
Sent: Tuesday, January 19, 2016 1:35 PM
To: Brandi Beaudet <bbeaudet@parkerranch.com>
Subject: Early consultation letter for Palila Forest Discovery Trail

Sent from Mail for Windows 10

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

01026PGH.16

January 18, 2016

Mr. Ron Terry
Principal
Geometrician Associates
P.O. Box 396
Hilo, Hawaii 96721

Attention: Ms. Amy Mutart

Dear Mr. Terry:

SUBJECT: Comments on Early Consultation for Environmental Assessment for Palila Forest Discovery Trail
TMK (3) 4-4-015: 004

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated January 7, 2016, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and HAR, Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological

bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb/, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

GH:ak

c: DOH-EPO [via e-mail Noella.Narimatsu@doh.hawaii.gov only]
EPO #16-012

William P. Kenoi
Mayor

Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT
349 Kapi'olani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-2389

January 19, 2016

Mr. Ron Terry, Principal
Geometrician Associates
P. O. Box 396
Hilo, HI 96721

Dear Mr. Terry:

SUBJECT: EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENT FOR PALILA FOREST DISCOVERY TRAIL, TMK (3) 4-4-015:004

Staff, upon reviewing the provided documents, does not anticipate any significant impact to traffic and/or other public safety concerns.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Richard Sherlock, S. Hilo Patrol Commander, at 961-2214.

Sincerely,

HENRY J. TAVARES, JR.
ASSISTANT POLICE CHIEF
AREA I OPERATIONS BUREAU

RS:lli
160026

From: Fritz Klasner
Sent: Friday, January 29, 2016 6:59 PM
To: RON
Subject: Re: Early consultation letter for Palila Forest Discovery Trail

Ron,
Thank you for the inquiry regarding the Palila Forest Discovery Trail.
We are very interested to see what type of ideas the group identifies to communicate and how this is done. OMKM anticipates pursuing an analogous concept in the future. To that end, please let us know if we can be of assistance, such as by providing technical literature on Maunakea's resources.

We encourage you to consider how invasive species prevention measures will be implemented prior to arrival at the Discovery Trail site. For example, if visitors are required or encouraged by signs to clean their vehicle of invasive species prior to turning off the paved highway, what preventative and control measures will be in place at this location.

We also recommend use of placenames consistent with Act 50 of the 1974 Hawaii State Legislature (http://www.capitol.hawaii.gov/hrscurrent/Vol01_Ch0001-0042F/HRS0004E/) and available via searchable database at http://geonames.usgs.gov/ as well as the State HBGN website http://planning.hawaii.gov/gis/hbgn/. For example, as a placename in any publication or other material used (or caused to be used) by the State, Pu'u La'au should be referred to as Pu‘ulā‘au.

OMKM would appreciate staying informed of this project. Physical copies of the EA are not needed when available online as advertised through the OEQC 'The Environmental Notice'.

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ENVIRONMENTAL ASSESSMENT

Palila Forest Discovery Trail

APPENDIX 1b
Comments to Draft EA and Responses

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William P. Kenoi
Mayor

Duane Kanuha
Director

Bobby Command
Deputy Director

West Hawai'i Office
74-5044 Ane Keohokalole Hwy
Kailua-Kona, Hawai'i 96740
Phone (808) 323-4770
Fax (808) 327-3563

County of Hawai'i
PLANNING DEPARTMENT

East Hawai'i Office
101 Pauahi Street, Suite 3
Hilo, Hawai'i 96720
Phone (808) 961-8288
Fax (808) 961-8742

March 1, 2016

Mr. Ron Terry
Geometrician Associates, LLC
P.O. Box 396
Hilo, HI 96721

Dear Mr. Terry:

Subject: **Pre-Consultation for Draft Environmental Assessment**
Project: Palila Forest Discovery Trail
TMK: (3) 4-4-015:004; Ka'ohe, Hamakua, Hawai'i

Thank you for your letter dated January 7, 2016, requesting comments from this office regarding the preparation of a Draft Environmental Assessment (DEA) for the subject project.

The Department of Land and Natural Resources, Division of Forestry and Wildlife, and Mauna Kea Forest Restoration Project are planning to construct and maintain the Palila Forest Discovery Trail. This multi-faceted initiative includes trail building and access improvements, informational signage and kiosks, website and literature development, volunteer management, and forest restoration.

The subject parcel consists of 7,203.883 acres. There is no County zoning for the property as it is located in the State Land Use Conservation District. In addition, according to the County of Hawai'i General Plan 2005, (amended December 2006) it is designated as Conservation by the Land Use Pattern Allocation Guide. Although the entire island of Hawai'i is within the Coastal Zone Management Area, the subject area is not located within the Special Management Area.

The project site is located in the Hāmākua Community Development Plan (CDP) planning area. The Hāmākua CDP has not yet been adopted and is currently in the planning process. Please include a discussion about the trail in relationship to the Community Objectives, adopted by the Hāmākua CDP Steering Committee. Those objectives can be found on online (http://www.hawaiicountycdp.info/hamakua-cdp/steering-committee/steering-committee-meetings/february-5-2013-hamakua-cdp-steering-committee-meeting/Community%20Objectives%20-%20Final.pdf) and include:

a. Protect, restore, and enhance watershed ecosystems, sweeping views, and open spaces from mauka forests to makai shorelines, while assuring responsible public access for recreational, spiritual, cultural, and sustenance practices;

b. Protect and restore viable agricultural lands and resources. Protect and enhance viewscapes and open spaces that exemplify Hāmākua's rural character;

c. Encourage community-based collaborative management plans to assure that human activities are in harmony with the quality of Hāmākua's unique natural and cultural landscape;

d. Protect and nurture Hāmākua's social and cultural diversity and heritage assets, including sacred places, historic sites and buildings, and distinctive plantation towns;

e. Develop and improve critical community infrastructure, including utilities, healthcare, emergency services, affordable housing, educational opportunities and recreational facilities to keep our 'ohana safe, strong, and healthy;

f. Promote, preserve and enhance a diverse, sustainable, local economy;

g. Encourage the increase and diversity of employment and living options for residents, including living wage jobs and entrepreneurial opportunities that allow residents to work and shop close to home and that complement Hāmākua's ecology, rural character, and cultural heritage;

h. Promote appropriate rural tourism that welcomes guests for an alternative visitor experience. Promote Hawai'i's host culture and Hāmākua's heritage roads, historic plantation towns, and festivals that celebrate our rich multi-cultural music, art, and agriculture.

We have no further comments to offer at this time.

If you have any questions or if you need further assistance, please feel free to contact Bethany Morrison of this office at 961-8138.

Sincerely,

DUANE KANUHA
Planning Director

BJM:klt
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geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Duane Kanuha, Director
Hawai'i County Planning Department
101 Pauahi Street, Suite 3
Hilo HI 96720

Dear Mr. Kanuha:

Subject: Comment to Early Consultation Letter and/or Draft Environmental Assessment, Palila Forest Discovery Trail

Thank you for the comment letter dated March 1, 2016, in response to the early consultation letter we had sent January 7, 2016. We appreciate the land use designation information you provided as well as the recommendation to consider the Hamakua CDP Steering Committee community objectives. These have been addressed in the Final EA. The Palila Forest Discovery Trail is highly consistent with many of these objectives and inconsistent with none of them.

We regret that we are not able to include your letter in the Draft EA, as it was received after the EA had been printed and sent to OEQC for publication. We are therefore including your letter and this response to it in the Final EA. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
EMD/CWB

03017PNN.16

March 8, 2016

Mr. Ron Terry
Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

SUBJECT: Comments on the Early Consultation for Environmental Assessment for Palila Forest Discovery Trail
TMK: (3) 4-4-015:004
Mauna Kea, Island of Hawaii, State of Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your transmittal, dated January 7, 2016, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and HAR, Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project

planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g., minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

NN:ak

c: DOH-EPO #16-012 [via e-mail Noella.Narimatsu@doh.hawaii.gov only]

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Alec Wong, P.E., Chief, Clean Water Branch
Hawai'i State Department of Health
PO Box 3378
Honolulu HI 96801-3378

Dear Mr. Wong:

Subject: **Comment to Draft Environmental Assessment on Palila Forest Discovery Trail**

Thank you for the comment letter dated March 8, 2016, in response to the early consultation letter we had sent January 7, 2016. We appreciate the information you provided, which was consulted and/or utilized in the preparation of the Draft EA.

In the letter, you provided references to DOH's standard comments, noted requirements in Chapters 11-54 and 11-55, HAR, related to water quality criteria and NPDES, recommended contact with the U.S. Army Corps of Engineers (USACE), and discussed re-use of water and green building practices. The State DLNR affirms the need to comply with the water quality regulations. No water bodies including streams, bays, ponds or wetlands are included in the project area and it therefore does not appear that permits related to Section 404 of the Clean Water Act are required. As stated in the EA, the project involves no use of water other than hand watering of seedlings after tree planting. Furthermore, all clearing will be by hand. There will be no grading or mechanical land clearing, and therefore the project would not appear to require a County grading permit or NPDES permit.

We regret that we are not able to include your letter in the Draft EA, as it was received after the EA had been printed and sent to OEQC for publication. We are therefore including your letter and this response to it in the Final EA. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal

William P. Kenoi
Mayor

Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT
349 Kapi'olani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-2389

March 14, 2016

Mr. Ron Terry
Geometrician Associates
P. O. Box 396
Hilo, HI 96721

Dear Mr. Terry:

Subject: Draft Environmental Assessment (DEA) for the Palila Forest Discovery Trail, Hāmākua District, Island of Hawaii, TMK (3) 4-4-015:004

Staff, upon reviewing the Draft Environmental Assessment, does not anticipate any significant impact to traffic and/or other public safety concerns.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Andrew Burian, Commander of the Hāmākua District, at (808) 775-7533 or via email at andrew.burian@hawaiicounty.gov.

Sincerely,

HENRY J. TAVARES JR.
ASSISTANT POLICE CHIEF
AREA I OPERATIONS BUREAU

AB:lli
160026

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Henry J. Tavares, Assistant Police Chief
Hawai'i County Police Department
349 Kapiolani Street
Hilo HI 96720

Dear Mr. Tavares:

Subject: **Comment to Draft Environmental Assessment on Palila Forest Discovery Trail**

Thank you for your comment letter on the Draft EA dated March 14, 2016, in which you stated that your agency does not anticipate any significant impact to traffic and/or other public safety concerns. We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

DAVID Y. IGE
GOVERNOR

FORD N. FUCHIGAMI
DIRECTOR

DEPUTY DIRECTORS
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HWY-PS 2.1858

March 17, 2016

Mr. Ron Terry
Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

Subject: Early Consultation for Draft Environmental Assessment
Palila Forest Discovery Trail
Hamakua, Mauna Kea, Hawaii
TMK: (3) 4-4-015: 004

The Department of Land and Natural Resources, Division of Forestry and Wildlife, Mauna Kea Forest Restoration Project, is collaborating with various conservation and other groups in a multi-faceted initiative to construct and maintain an approximately one-mile long Palila Forest Discovery Trail with improvements on the slopes of Pu'u La'au, Mauna Kea.

The nature of the project as a hiking and interpretive recreation facility is not anticipated to have a significant impact to our State highway facilities.

If there are questions, please contact Nami Wong, Systems Planning Engineer, Highways Division, Planning Branch, at (808) 587-6336 and reference file review number PS 2016-006.

Sincerely,

FORD N. FUCHIGAMI
Director of Transportation

c: Suzanne Case, Chair – Department of Land and Natural Resources

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phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Ford N. Fuchigami
Director of Transportation
State of Hawai'i
869 Punchbowl Street
Honolulu HI 96813-5097

Dear Mr. Fuchigami:

Subject: Comment to Draft Environmental Assessment on Palila Forest Discovery Trail

Thank you for your comment letter on the Draft EA dated March 17, 2016, in which you stated that the project is not anticipated to have a significant impact to State highway facilities. We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

AMERICAN BIRD CONSERVANCY

Bringing back the birds

Ron Terry
Geometrician Associates
PO Box 396
Hilo, HI 96721

30 March 2016

RE: Draft EA for Palila forest discovery trail, TMK (3rd.) 4-4-015:004 (por.) Hamakua District, Hawai'i.

American Bird Conservancy (ABC) is a 501(c)(3), not-for profit organization whose mission is to conserve native birds and their habitats throughout the Americas, acting across the full spectrum of threats to birds to safeguard the rarest bird species, restore habitats, and reduce threats. We have been working in Hawai'i, particularly with Palila on Mauna Kea, since 2009, as well as on a range of projects to restore native forests, protect endemic birds from non-native predators, and create additional populations of endangered birds through translocations. ABC is collaborating with the State of Hawai'i's Division of Forestry and Wildlife's Mauna Kea Forest Restoration Project on the Palila forest discovery trail because **we strongly believe the trail is an important outreach tool that will have long-term benefits to conservation of the endangered Palila.**

Two of the biggest challenges conservationists face is educating people about the threats to Hawai'i's native biodiversity and motivating citizens to support protection and management of native species. This trail will educate the users and encourage them to become more involved. Most people in Hawai'i are unaware of the critically endangered native birds that live in the high elevation forests, unfortunately epitomizing the "out of sight, out of mind" truism. This trail's interpretive signs and interactive QR codes will provide a permanent way of educating the public about the Palila, native forest, threats to the forest, management actions, and cultural connections in the region. The trail's location, in recovering native forest at the edges of habitat currently occupied by Palila, will target people using Mauna Kea who likely to most receptive to the message. It will also be a showcase for native forest recovery and provide continual public outreach to encourage additional volunteers to assist with outplantings and other restoration tasks.

The trail route was designed to have minimal impact to the native vegetation, so **ABC agrees and supports the draft "Finding Of No Significant Impact (FONSI)."** In association with our restoration of the Ka'ohe Restoration Area, hundreds of native seedlings will be outplanted along the trail route. There are no threatened or endangered plants at the site, disturbance of native species will be minimized, and no native trees will be removed. Therefore, construction of this trail will have a net positive effect on Palila and the māmane forest of Mauna Kea.

Mahalo for the opportunity to comment on this important decision. Aloha –

George E. Wallace, Ph.D.
gwallace@abcbirds.org
Vice President, Oceans & Islands Division
540-253-5780

Chris Farmer, Ph.D.
cfarmer@abcbirds.org
Hawai'i Program Director
808-987-1779

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

George Wallace, Ph.D., Vice President, Oceans and Islands Division, and
Chris Farmer, Ph.D., Hawai'i Program Director
American Bird Conservancy
PO Box 249
4249 Loudoun Avenue
The Plains, VA 20198

Dear Dr. Wallace and Dr. Farmer:

Subject: **Comment to Draft Environmental Assessment on Palila Forest Discovery Trail**

Thank you for your comment letter on the Draft EA dated March 10, 2016, in which you stated that you believe the trail is an important outreach tool that will have long-term benefits to conservation of the endangered Palila. We appreciate your concurrence with the appropriateness of the Finding of No Significant Impact.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

PHONE (808) 594-1888

FAX (808) 594-1938

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
560 N. NIMITZ HWY., SUITE 200
HONOLULU, HAWAI'I 96817

HRD16-7727B

March 29, 2016

Ron Terry, Principal
Geometrician Associates, LLC
PO Box 396
Hilo, HI 96721

Re: Comments on the Draft Environmental Assessment for the Palila Forest Discovery Trail
Ka'ohe Mauka Ahupua'a, Hāmākua Moku, Hawai'i Mokupuni
Tax Map Key (3) 4-4-015:004 (por.)

Aloha Mr. Terry:

The Office of Hawaiian Affairs (OHA) is in receipt of your March 9, 2016 letter requesting comments on the draft environmental assessment (DEA) and anticipated finding of no significant impact (AFONSI). Geometrician Associates, LLC is acting on behalf of the State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW).

DOFAW is proposing the construction and maintenance of the Palila Forest Discovery Trail, in collaboration with the American Bird Conservancy, the Mauna Kea Beach Hotel, and several community volunteer groups. The initiative includes trail building, access improvements, informational signage, kiosks, website and literature development, volunteer management, and forest restoration. The one-mile loop trail will meander through the high-elevation forest on the slopes of Pu'u Lā'au, Mauna Kea. In addition, this project will include reforestation efforts of native plants providing habitat for native endangered birds, such as the Hawai'i Creeper and 'Akiapōlā'au.

OHA does not have any concerns with the project at this time as there will be minimal ground disturbances, which are limited to hand tool labor, step-building, rock-stacking, and placement of the kiosk and signage. In addition, all necessary precautions are being taken to

protect native flora and fauna species, while promoting efforts of reforestation of native plants. We support the purpose of the project, as it will allow individuals to appreciate and protect the beauty of Hawai'i's endemic environment upon the isolated slopes of Mauna Kea.

Mahalo for the opportunity to provide comments. Should you have any questions, please contact Jeannin Jeremiah at 594-1790 or by email at jeanninj@oha.org.

'O wau iho nō me ka 'oia 'i'o,

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC:jj

C: John Vetter – Department of Land and Natural Resources, Division of Forestry and Wildlife

Please address replies and similar, future correspondence to our agency:
Dr. Kamana'opono Crabbe
Attn: OHA Compliance Enforcement
560 N. Nimitz Hwy, Ste. 200
Honolulu, HI 96817

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer
560 N. Nimitz Hwy., Suite 200
Honolulu HI 96817

Dear Dr. Crabbe:

Subject: **Comment to Draft Environmental Assessment on Palila Forest Discovery Trail**

Thank you for your comment letter on the Draft EA dated March 29, 2016, in which you stated that your agency had no concerns about the project, based on the very minimal level of disturbance it involves. On behalf of the DLNR, I would also like to thank you for the support you expressed for the project and its goals to allow individuals to appreciate and protect the beauty of Hawai'i's endemic environment on the slopes of Mauna Kea.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 16-012

February 16, 2016

Mr. Ron Terry
Geometrician Associates, LLC
P.O. Box 398
Hilo, Hawaii 96721
Email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation (EC) for Environmental Assessment for Palila Forest Discovery Trail TMK: (3) 4-4-015:004

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EC to our office on January 8, 2016. Thank you for allowing us to review and comment on the proposed project. The EC was routed to the District Health Office on Hawaii and the Clean Water Branch. They will provide specific comments to you if necessary. EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

Attachments: OEQC viewer - http://eha-web.doh.hawaii.gov/oeqc-viewer
U.S. EPA EJSCREEN Map 3 page report - http://www2.epa.gov/ejscreen

c: DHO Hawaii, CWB {via email only}

mauna kea state park

6 sites found

Results | Filter

Show sites with no location

Mauna Kea Comp Management Plan (DEA-AFNSI)
Environmental Assessment (Agency)

Mauna Kea Comp Management Plan (FEA-FONSI)
Environmental Assessment (Agency)

Thirty Meter Telescope (FEIS)
Environmental Impact Statement (Agency)

Saddle Road Mamalahoa Hwy (SFEIS)
Environmental Impact Statement (Agency)

PANORAMIC SURVEY TELESCOPE AND RAPID RESPONSE SYSTEM (FEA-EISPN)
Environmental Impact Statement (Agency)

Thirty Meter Telescope (DEIS)
Environmental Impact Statement (Agency)

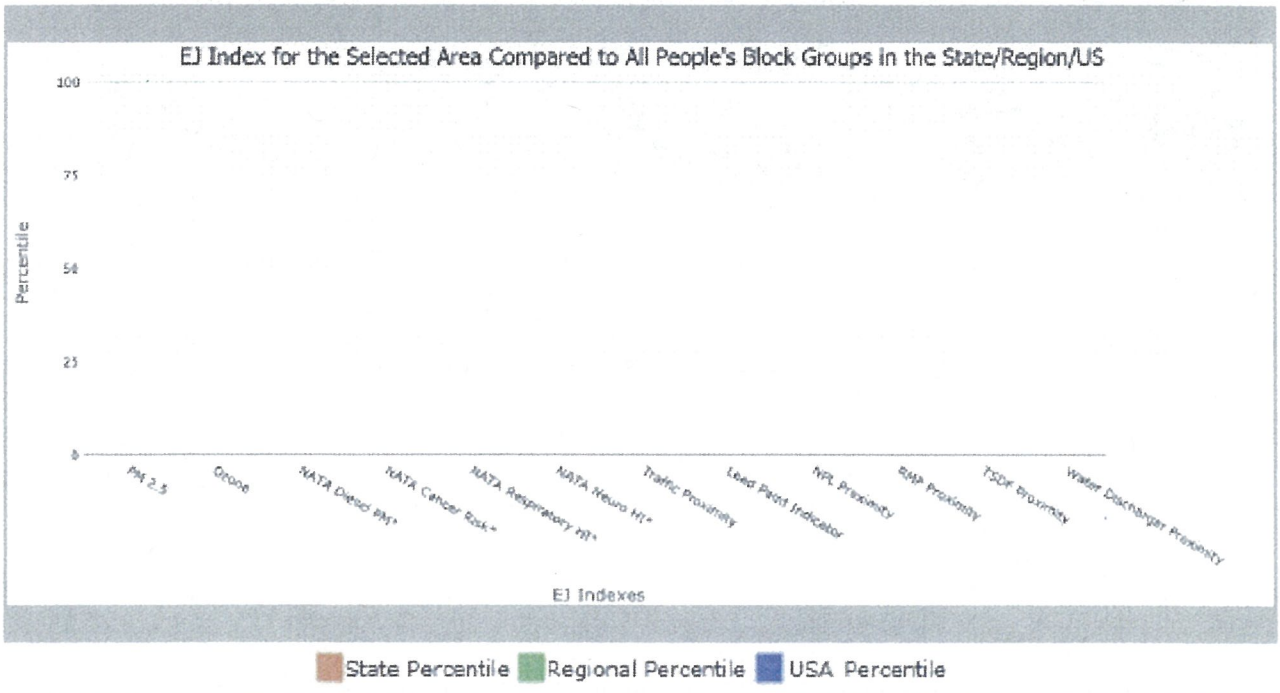


EJSCREEN Report

for 1 mile Ring Centered at 19.819638,-155.693527, HAWAII, EPA Region 9

Approximate Population: 0

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	N/A	N/A	N/A
EJ Index for Lead Paint Indicator	N/A	N/A	N/A
EJ Index for Proximity to NPL sites	N/A	N/A	N/A
EJ Index for Proximity to RMP sites	N/A	N/A	N/A
EJ Index for Proximity to TSDFs	N/A	N/A	N/A
EJ Index for Proximity to Major Direct Dischargers	N/A	N/A	N/A



This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report

for 1 mile Ring Centered at 19.819638,-155.693527, HAWAII, EPA Region 9

Approximate Population: 0



EJSCREEN Report

for 1 mile Ring Centered at 19.819638,-155.693527, HAWAII, EPA Region 9

Approximate Population: 0

Selected Variables	Raw Data	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m³)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Cancer Risk (lifetime risk per million)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	N/A	280	N/A	190	N/A	110	N/A
Lead Paint Indicator (% Pre-1960 Housing)	N/A	0.17	N/A	0.25	N/A	0.3	N/A
NPL Proximity (site count/km distance)	N/A	0.092	N/A	0.11	N/A	0.096	N/A
RMP Proximity (facility count/km distance)	N/A	0.18	N/A	0.41	N/A	0.31	N/A
TSDF Proximity (facility count/km distance)	N/A	0.092	N/A	0.12	N/A	0.054	N/A
Water Discharger Proximity (facility count/km distance)	N/A	0.33	N/A	0.19	N/A	0.25	N/A
Demographic Indicators							
Demographic Index	N/A	51%	N/A	46%	N/A	35%	N/A
Minority Population	N/A	77%	N/A	57%	N/A	38%	N/A
Low Income Population	N/A	25%	N/A	35%	N/A	34%	N/A
Linguistically Isolated Population	N/A	6%	N/A	9%	N/A	5%	N/A
Population With Less Than High School Education	N/A	10%	N/A	18%	N/A	14%	N/A
Population Under 5 years of age	N/A	6%	N/A	7%	N/A	7%	N/A
Population over 64 years of age	N/A	14%	N/A	12%	N/A	13%	N/A

* The National-scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: http://www.epa.gov/ttn/atw/natamain/index.html.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 16-085

March 15, 2016

Mr. Ron Terry
Geometrician Associates
P.O. Box 396
Hilo, Hawaii 96721
Email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment (DEA) for Palila Forest Discovery Trail, Hamakua, Hawaii TMK: (3rd) 4-4-015:004 (por.)

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your DEA to our office via the OEQC link: http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Hawaii/2010s/2016-03-08-HA-5B-DEA-Palila-Forest-Discovery-Trail.pdf

EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all relevant comments. EPO has recently updated and compiled by branch/office various environmental health maps. They are available online at: http://health.hawaii.gov/epo/egis

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer This viewer geographically shows where previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared (up to 2010).

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

Attachment 1: OEQC viewer

c: DOH: DHO HI {via email only}


hawaii.gov
Stay Connected
OEQC Viewer
saddle road
5 sites found
Results
Filter
Keaau Pahoa Road (DEA-AFNSI)
Environmental Assessment (Agency)
WAIPIO POINT ACCESS ROAD IMPROVEMENTS (FEA-FONSI)
Environmental Assessment (Agency)
Kuhio Hwy Bypass Road (DEA-AFNSI)
Environmental Assessment (Agency)
Keaau Pahoa Road Improvements (FEA-FONSI)
Environmental Assessment (Agency)
FORT WEAVER ROAD SEWER (FEA-FONSI)
Environmental Assessment (Agency)
Hybrid
200
Saddle Rd
Kulahana Hunter Checking Station
Google
Map data ©2015 Google Imagery ©2015, DigitalGlobe
Report a map error

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ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Laura Leialoha McIntyre, Program Manager
Hawai'i State Department of Health EPO
epo@doh.hawaii.gov

Dear Ms. McIntyre:

Subject: Comment to Draft Environmental Assessment on Palila Forest Discovery Trail

Thank you for the comment letter dated February March 8, 2016, in response to the early consultation letter we had sent January 7, 2016, as well as the later comment sent on March 15, 2016, in response to the Draft EA. We regret that we are not able the first letter in the Draft EA, as it was received after the EA had been printed and sent to OEQC for publication. We are therefore including both letters and this response to them in the Final EA. We appreciate the information you provided, which was consulted and/or utilized in the preparation of the Draft EA.

In the letter, you made indicated that you had routed the letter to other DOH offices and also provided references, which we will take the opportunity to respond to at this point.

1. *EPO standard comments, Environmental Health Portal, Water Quality Standards*, etc. Thank you for referencing these websites. In the case of this project, no grading of any type will be conducted and no water bodies are nearby.

2. *EPA EJSCREEN.* Thank you for the reference to the EPA site and the information you provided.

If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

DAVID Y. IGE
GOVERNOR OF HAWAI'I

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON P.E.
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAI'I 96809

REF:OCCL:TM

Correspondence: HA 16-163

MEMORANDUM

MAR 3 1 2016

TO: Jackson M. Bauer, Former Outreach Coordinator
Mauna Kea Forest Restoration Project
Division of Forestry & Wildlife
19 E. Kawili Street
Hilo, HI 96720

FROM: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: Draft Environmental Assessment for the Palila Forest Discovery Trail Located at Hāmākua, Ka'ohe 3rd, Hawai'i, TMK: (3) 4-4-015:004

The Office of Conservation and Coastal Lands (OCCL) has reviewed the subject document and notes the Palila has been listed as an endangered species since 1967, and the subject area has been designated as Critical Habitat by the federal government in 1977. The parcel has been set aside on October 16, 1950 via Executive Order 1398 as Public Hunting Ground and Game Reserve under the control and management of the Division of Forestry & Wildlife.

According to the information presented, a 0.92-mile self-led trail through māmane and naio trees is proposed on the western slope of Mauna Kea. Educational kiosk and markers for QR codes will be placed along the trail. Creation of the trail will be limited to hand tool labor, step-building, rock-stacking and kiosk and sign placement. A composting toilet and covered shelter are also proposed. Native plantings to restore the forest will also be done. The purpose of the project is to enhance education and protection for native species highlighting the Palila. A daily average of 10 additional users to the area is expected.

The OCCL notes the project area lies within the Protective subzone of the Conservation District. The OCCL believes the proposed management activities may be considered an existing land use to the Critical Palila Habitat and Game Management Area pursuant to the Hawai'i Administrative Rules (HAR), §13-5-22 P-8 STRUCTURES AND LAND USE, EXISTING (B-1) Demolition, removal, or minor alteration of existing structures, facilities, land, and equipment. Any historical property shall be evaluated by the department for historical significance.

The Educational kiosk and markers; composting toilet and covered shelter may be considered accessory structures to the existing Game Management Area and are also identified land uses pursuant to HAR, §13-5-22 P-9 STRUCTURES, ACCESSORY (B-1) construction or placement of structures accessory to existing facilities or uses.

Native plantings are also an identified land use pursuant to HAR, §13-5-22 (B-2) Planting of native and endemic plants and fence maintenance. New fence ex-closures for native plants or small native wildlife communities, in an area greater than one acre.

These proposed land uses require filing for a Site Plan Approval (SPA). Upon completion of the final EA, please apply for a SPA. Should you have any questions regarding this memorandum, contact Tiger Mills of our Office at (808) 587-0382.

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Samuel J. Lemmo, Administrator
Hawaii State DLNR Office of Conservation and Coastal Lands
PO Box 621
Honolulu HI 96809

Dear Mr. Lemmo:

Subject: **Comment to Early Consultation Letter and/or Draft Environmental Assessment, Palila Forest Discovery Trail**

Thank you for the comment letter on the Draft EA dated March 31, 2016, in which you stated that the project site lies within the Protective subzone of the Conservation District. Furthermore, your office has determined that the proposed project is a land use identified as P-8, STRUCTURES AND LAND USE, EXISTING (B-1), and P-9, STRUCTURES, ACCESSORY (B-1), requiring Site Plan Approval (SPA). As such, the Mauna Kea Forest Restoration Project will apply for Site Plan Approval upon completion of the EA.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

DAVID Y. IGE
GOVERNOR

SCOTT GLENN
DIRECTOR

DEPARTMENT OF HEALTH, STATE OF HAWAI'I
235 South Beretania Street, Suite 702, Honolulu, HI 96813

Phone: (808) 586-4185
Email: oeqchawaii@doh.hawaii.gov

April 6, 2016

John Vetter, Wildlife Biologist
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street, Rm. 325
Honolulu, HI 96813

Dear Mr. Vetter,

SUBJECT: Draft Environmental Assessment (EA) for Palila Forest Discovery Trail, TMK (3rd,) 4-4-015 (por.) Hāmākua District, Island of Hawai'i

The Office of Environmental Quality Control (OEQC) reviewed the Draft EA prepared for the subject project and offers the following comments for your consideration.

The OEQC commends the project for increasing public awareness and interaction with a vanishing ecosystem. Since the methods of planting can have additional environmental impacts not originally captured in the Draft EA, please include a description of the māmane and naio reforestation activities and any mitigation measures as appropriate (HAR §11-200-10(7)).

Lastly, changing weather patterns in the Pacific are projected to result in localized increased precipitation severity, such as periodic extreme heavy downpours. Predicted climate changes and their implications for future forests in the conservation area should be discussed.

Thank you for the opportunity to comment on the Draft EA. We look forward to a response that also will be included within the project's Final EA. If you have questions about these comments, please consult myself or Tom Eisen in our office at (808) 586-4185.

Sincerely,

Scott Glenn, Director

cc: Ron Terry, Geometrician Associates

16-250

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

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

Dear Mr. Glenn:

Subject: **Comment to Draft Environmental Assessment on Palila Forest Discovery Trail**

Thank you for your comment letter on the Draft EA dated April 6, 2016. In response to your individual comments.

1. *Description of the māmane and naio restoration efforts.* Steady reforestation of native trees and shrubs is an ongoing activity in the Mauna Kea Forest Reserve and adjacent areas that is part of DOFAW's management of the property. Although every human action has some environmental consequences, adverse effects associated with natural forest restoration are among those actions with very negligible adverse effects. These mainly include the emissions of fossil fuel burned in trucks that transport seedlings, personnel and water to the planting site. However, the net benefit to carbon uptake and storage, not to mention soil stabilization, wildlife and endangered plant habitat, watersheds, scenery and recreation, is very high. The Mauna Kea Forest Restoration Project (MKFRP) will be planting a total of about 6,000 trees: 1,000 of them fairly close to the trail site, and 5,000 in the neighboring Ka'ohe Restoration Area, all of it within Palila Critical Habitat. A mixture of māmane, 'a'ali'i and 'iliahi will be planted to improve and restore habitat for palila. The seed source is directly from the project area. The plants are propagated at both the Waimea State Tree Nursery and the Native Nursery on Maui (State contract). Seedlings will be planted by hand using dibble sticks to make holes, utilizing mostly volunteer labor, with five staff. This is consistent with MKFRP's mandate since 2006 and its current operations of restoring palila habitat. Each plant will be watered by backpack sprayer immediately after planting with about two cups of water. Occasional supplemental hand watering may occur in the following months as practical and if staffing is available. Once the trees are in place and as long as protective fencing is maintained, the forest should thrive on its own.

Adverse impacts associated with planting are mitigated by common-sense procedures such as not allowing trucks to drive into vegetated areas, cleaning boots and equipment before planting to avoid spreading invasive species, and monitoring for invasive species. The simple methods of hand planting produce no erosion or sedimentation impacts.

2. *Accounting for climate change in the project.* The MKFRP is aware that worldwide climate change could involve noticeable changes on the climate and vegetation zones of Mauna Kea. Many climate scientists believe that temperatures on the middle slopes of the mountain above the current mean tradewind inversion elevation will become wetter through a rise in that elevation. Others predict drier and warmer conditions in this zone. The timing and magnitude of these quite opposite effects are not currently determinable. The degree of variability is another unknown. Of course it is also entirely possible that for the near-term future, the climate will remain essentially the same. We would refer you to the *Natural Resources Management Plan for the UH Management Area on Mauna Kea* conducted by the Office of Mauna Kea Management in 2009 for an excellent discussion. In summary, while climate change may occur that will cause a hiking family fifty years from now to observe more native plants and birds on the trail, or less, or the same, climate change will not adversely affect use. DOFAW maintains trails throughout the Big Island, with its full gamut of climates and geological substrates, and there should be no maintenance issues. Whatever the climate, a short nature trail on the slopes of Mauna Kea would likely continue to be useful. This discussion has been added to the Final EA.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 7, 2016

State of Hawaii
Department of Land and Natural Resources
Division of Forest and Wildlife
Attention: Mr. Jackson Bauer
19 E. Kawili Street
Hilo, Hawaii 96720

Dear Mr. Bauer:

SUBJECT: Draft Environmental Assessment (DEA) for the Palila Forest Discovery Trail

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division – Hawaii District on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

'16 MAR 17 AM 10:49 ENGINEERING

March 16, 2016

MEMORANDUM

TO: FROM:

DLNR Agencies:
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
_X_ Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_ Land Division – Hawaii District
_X_ Historic Preservation

TO:
FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Assessment (DEA) for the Palila Forest Discovery Trail
LOCATION: Hamakua District; Island of Hawaii; TMK: (3) 4-4-015:004 (por.)
APPLICANT: DLNR – Division of Forestry and Wildlife

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **April 6, 2016**.

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice under Quick Links on the right.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed:
Print Name: Carty S. Chang, Chief Engineer
Date: 3/24/16

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

To: Land Division/ Russell Y. Tsuji

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a designated Flood Hazard.

The owner or the project property and/or their representative is responsibile to research the Flood Hazard Zone designation for the project. Flood Hazard Zone designations can be found using the Flood Insurance Rate Map (FIRM), which can be accessed through the Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

National Flood Insurance Program establishes the rules and regulations of the NFIP - Title 44 of the Code of Federal Regulations (44CFR). The NFIP Zone X is a designation where there is no perceived flood impact. Therefore, the NFIP does not regulate any development within a Zone X designation.

Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4846.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 3/24/16

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 16, 2016

RECEIVED
LAND DIVISION
2016 MAR 31 AM 11:09
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
_X_ Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_ Land Division – Hawaii District
_X_ Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Assessment (DEA) for the Palila Forest Discovery Trail
LOCATION: Hamakua District; Island of Hawaii; TMK: (3) 4-4-015:004 (por.)
APPLICANT: DLNR – Division of Forestry and Wildlife

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **April 6, 2016**.

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice under Quick Links on the right.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

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

Signed: _____

Print Name: GORDON C. HEIT
Date: 3/28/16

cc: Central Files

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

April 15, 2016

Russell Y. Tsuji, Administrator
Hawai'i State DLNR Land Division
P.O. Box 621
Honolulu HI 96809

Dear Mr. Tsuji:

Subject: **Comment to Early Consultation Letter and/or Draft Environmental Assessment, Palila Forest Discovery Trail**

Thank you for your comment letter dated April 7, 2016, on the Draft EA. We first wish to acknowledge the no-objections memo by the Hawai'i District Land Division. We also note the determination by the Engineering Division that the project site lies within Flood Zone X, which verifies the information contained in the Draft EA.

We very much appreciate your review of the document, including circulation to various DLNR agencies. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

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ENVIRONMENTAL ASSESSMENT

Palila Forest Discovery Trail

APPENDIX 2
Archaeological Assessment Survey and Correspondence

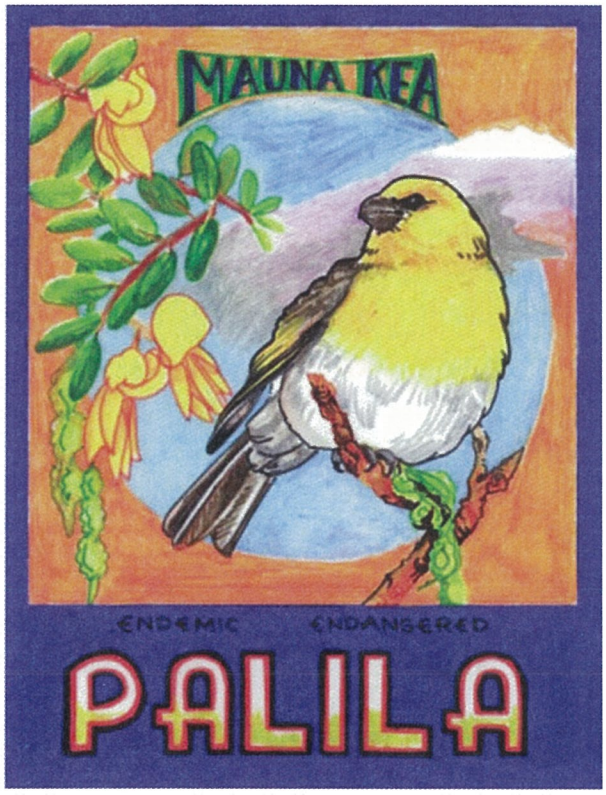
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An Archaeological Assessment Survey of the Proposed Palila Forest Discovery Trail

TMK: (3) 4-4-015:004 por.

Ka'ohe 3 Ahupua'a
Hāmākua District
Island of Hawai'i

DRAFT VERSION



Prepared By:

Matthew R. Clark, B.A.
and
Robert B. Rechtman, Ph.D.

Prepared For:

Ron Terry, Ph.D.
Geometrician Associates, LLC
P.O. Box 396
Hilo, HI 96721

February 2016

ASM affiliates
Archaeology • History • Ethnography • Architectural History
Office: (808) 969-6066 • Fax: (808) 443-0065

ASM Project Number 25650.00

An Archaeological Assessment Survey of the Proposed Palila Forest Discovery Trail

TMK: (3) 4-4-015:004 por.

Ka'ohe 3 Ahupua'a
Hāmākua District
Island of Hawai'i

ASM affiliates

EXECUTIVE SUMMARY

At the request of Ron Terry of Geometrician Associates, LLC, on behalf of Jackson Bauer of the Mauna Kea Forest Restoration Project, ASM Affiliates conducted an Archaeological Assessment survey of the roughly 1.5 kilometer long proposed Palila Forest Discovery Trail across a portion of TMK: (3) 4-4-015:004 in Ka'ohe 3 Ahupua'a, Hāmākua District, Island of Hawai'i. The current study, which was conducted in support of an Environmental Assessment (EA) being prepared for the Palila Forest Discovery Trail project, was undertaken in accordance with Hawai'i Administrative Rules 13§13–275, and was performed in compliance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports as contained in Hawai'i Administrative Rules 13§13–276. According to 13§13-275-5(b)(5)(A) when no archaeological resources are discovered during an archaeological survey the production of an Archaeological Assessment report is appropriate.

Fieldwork consisted of a pedestrian survey of the Proposed Palila Forest Discovery Trail route, the adjacent, grassy forest restoration areas, and the previously graded parking and restroom locations. During the fieldwork the surface of the entire study area, was examined for extant archaeological remains, but none were encountered. Given these negative findings, it is our conclusion that the proposed Palila Forest Discovery Trail will not affect any historic properties. With respect to the historic preservation review process of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawai'i Planning Department, our recommendation is that no further work needs to be conducted prior to or during project implementation. In the unlikely event that significant archaeological resources are discovered during the implementation of the trail project, work should cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

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1. INTRODUCTION

At the request of Ron Terry of Geometrician Associates, LLC, on behalf of Jackson Bauer of the Mauna Kea Forest Restoration Project, ASM Affiliates conducted an Archaeological Assessment survey of the roughly 1.5 kilometer long proposed Palila Forest Discovery Trail across a portion of TMK: (3) 4-4-015:004 in Ka'ohe 3 Ahupua'a, Hāmākua District, Island of Hawai'i (Figures 1and 2). The Palila Forest Discovery Trail project is a multi-faceted initiative of the Department of Forestry and Wildlife (DOFAW), planned within the State-owned Ka'ohe Game Management Area, that includes trail building and access improvements, informational signage and kiosks, website and literature development, volunteer management, and forest restoration (Figure 3). The loop trail meanders through a representative and mostly intact portion of the high elevation forest at Pu'u La'au on the southwestern slope of Mauna Kea that is dominated by native *māmane* (*Sophora chrysophylla*) and *naio* (*Myoporum sandwicensen*) trees. This trail will provide the first and only means of public interpretation of the high-elevation dry forest and *palila* (*Psittirostra bailleui*) bird habitat found on Mauna Kea.

The current study, which was conducted in support of an Environmental Assessment (EA) being prepared for the Palila Forest Discovery Trail project, was undertaken in accordance with Hawai'i Administrative Rules 13§13–275, and was performed in compliance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports as contained in Hawai'i Administrative Rules 13§13–276. According to 13§13-275-5(b)(5)(A) when no archaeological resources are discovered during an archaeological survey the production of an Archaeological Assessment report is appropriate. Compliance with the above standards is sufficient for meeting the historic preservation review process requirements of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawai'i Planning Department. This report provides a study area description, a detailed culture-historical background, a discussion of prior archaeological studies conducted in the vicinity of the current study area, and the results of the field investigation.

DESCRIPTION OF THE PALILA FOREST DISCOVERY TRAIL STUDY AREA

The Palila Forest Discovery Trail study area consists of a portion of TMK: (3) 4-4-015:004 located within the Ka'ohe Game Management Area in Ka'ohe 3rd Ahupua'a, Hāmākua District, Island of Hawai'i (see Figures 1and 2). Located at an elevation of about 7,400 feet (2,255 meters) above sea level on the southwestern slope of Mauna Kea, the study area has a cool climate with daytime temperatures in the low 60s (Fahrenheit) and nighttime temperatures that often dip into the 40s (Fahrenheit) or lower. Annual rainfall at this elevation averages about 20 to 22 inches (Giambelluca et al. 2012). Geologically, the study area is situated on the Pu'u La'au scoria cone (hmc) and adjacent hawaiite and mugearite lava flows (I and hm) that originated from Mauna Kea volcano during the late Pleistocene, between 14,000 and 65,000 years before the present (Wolfe and Morris 1996; Figure 4). Soils that have developed within this area are classified as Pohakulehu very cobbly medial very fine sandy loam on 12-20 percent slopes (http://websoilsurvey. nrcs.usda.gov/ app/WebSoilSurvey.aspx).

The study area is situated within the subalpine, dry *māmane/naio* forest zone (Gagne and Cuddihy 1990) that traditionally contained an understory various native herbs, shrubs, and grasses. Currently, the over story vegetation within the study area is dominated by mature *māmane* (*Sophora chrysophylla*) and *naio* (*Myoporum sandwicensen*) trees, but as a result of more than a century of grazing ungulates, the understory vegetation consists mostly of non-native pasture grasses (Figure 5) including orchard grass (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), *Eragrostis brownei* and sweet vernal grass (*Anthoxanthum odoratum*), plus several non-native herbs and shrubs including fireweed (*Senecio madagascariensis*), yarrow (*Achillea millefolium*) and mullein (*Verbascum thapsus*), with only a few emergent native *māmane* seedlings present (Geometrician 2013). A roughly 2-acre area, near the center of the proposed trail route, was fenced in 1991 by the Division of Forestry and Wildlife to protect critical sandalwood (*Santalum paniculatum*) habitat (Figure 6). This area contains a more intact example of the subalpine, dry *māmane/naio* native forest with some large *'iliahi* (sandalwood) trees and seedlings also present.

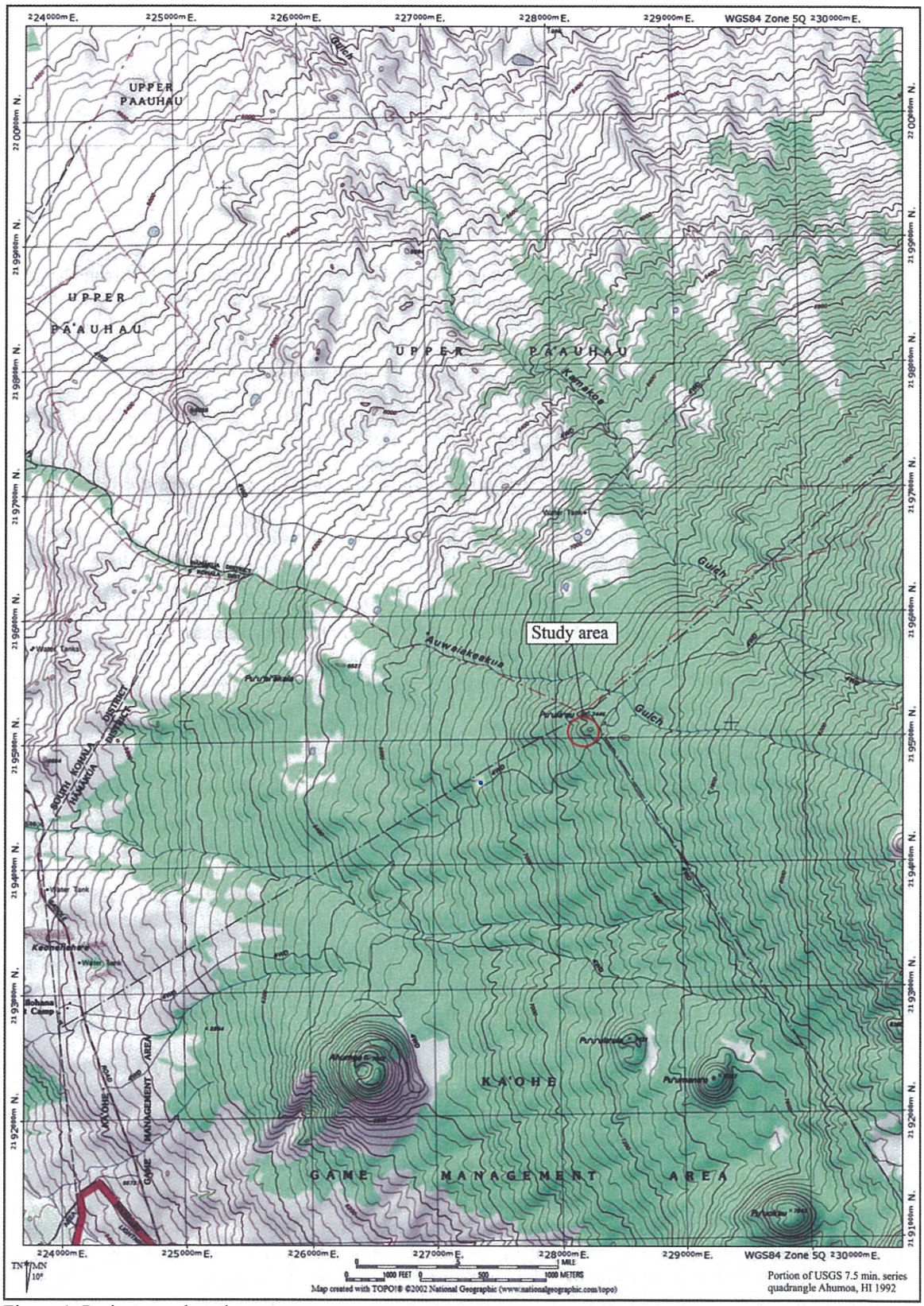


Figure 1. Project area location.

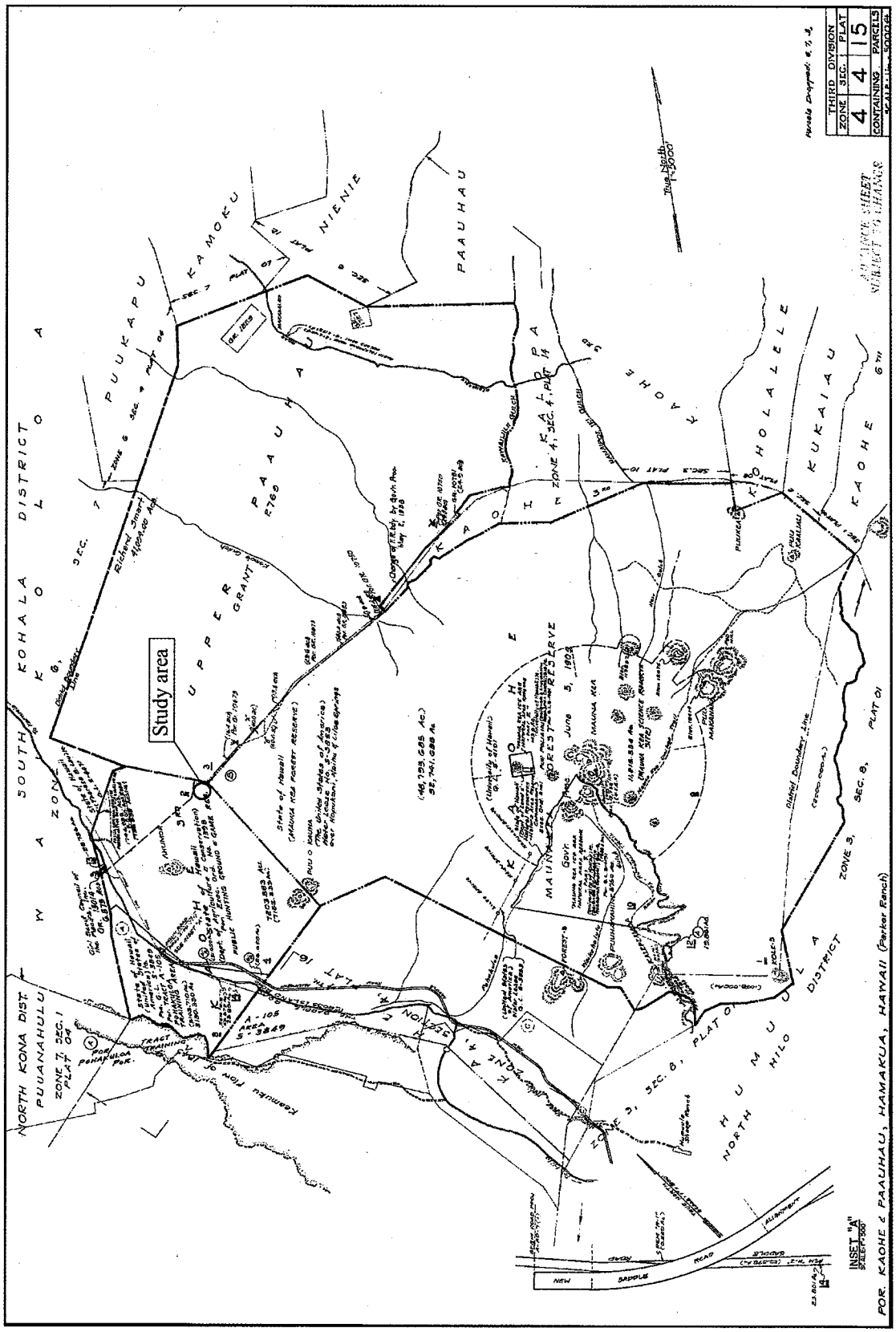


Figure 2. Tax Map Key (TMK): (3) 4-4-015 showing the current study area location (portion of Parcel 004).

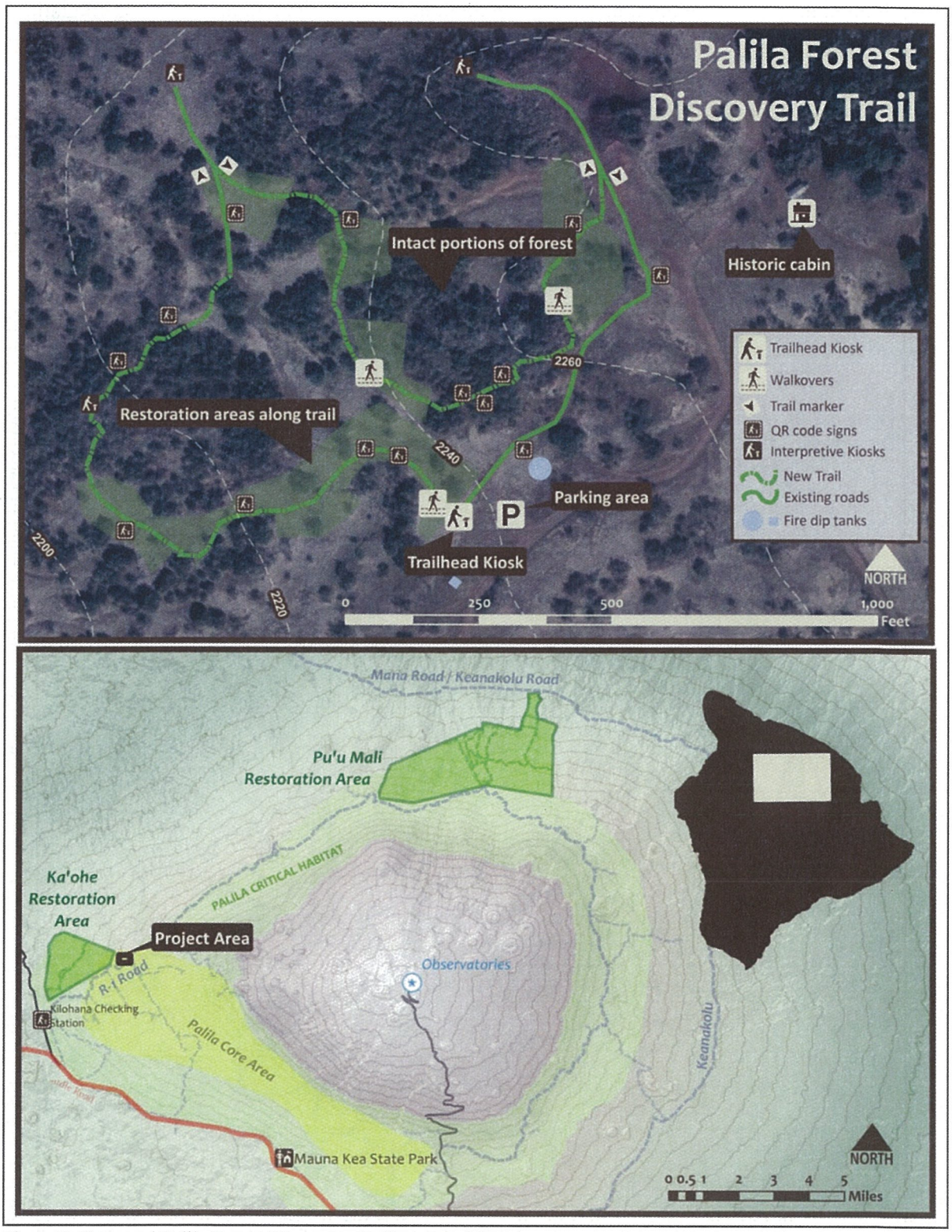


Figure 3. Proposed Palila Forest Discovery Trail plan and location.

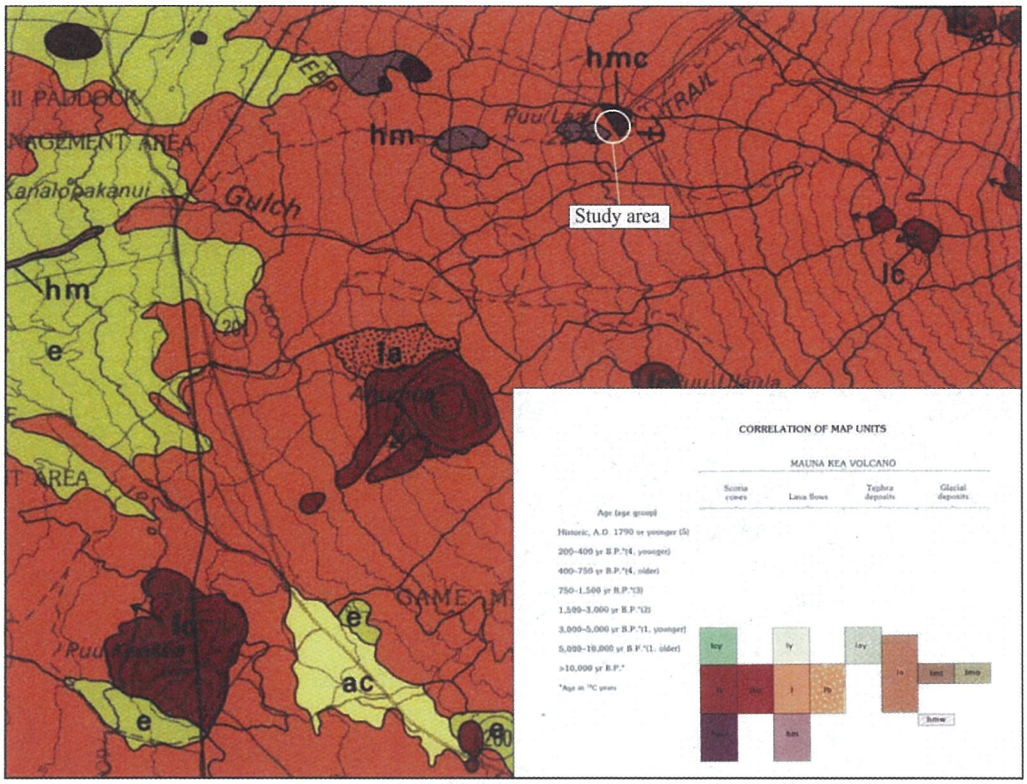


Figure 4. Portion of a *Geologic Map of the Island of Hawai'i* (Wolfe and Morris 1996) showing the current study area.



Figure 5. Typical vegetation along the route of the trail, view to the northwest.

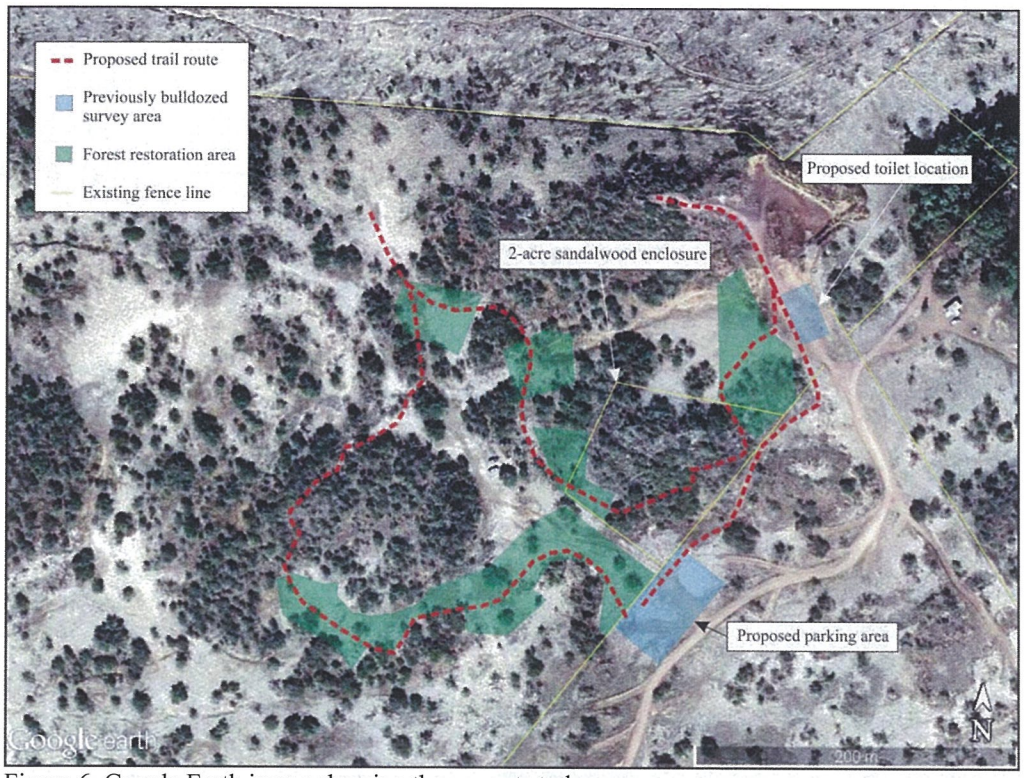


Figure 6. Google Earth image showing the current study area.



Figure 7. More intact native forest within the sandalwood enclosure, view to the northeast.

The *māmane/naio* forest in the vicinity of the study area contains over 95% of the remaining native Hawaiian *palila* (*Loxioides bailleui*) bird population (Camp and Banko 2012), along with several other bird species including the native *'amakihi* (*Hemignathus virens virens*) and *'apapane* (*Himatione sanguinea*), the endemic *'elepaio* (*Chasiempis sandwichensis*), and alien species such as house finches, Japanese white-eyes, Eurasian skylarks, and numerous gamebirds (Geometrician 2013). This area, which is accessed from Saddle Road (Hwy 200) at the Kilohana Hunter check-in station by 4-wheel drive roads (Road R-1), is frequented by hunters and bird enthusiasts alike. Hawai'i Forest and Trail currently has a permit to conduct bird watching tours in the vicinity of the study area. In an effort to protect the *māmane/naio* forest critical *palila* habitat from fire, the Division of Forestry and Wildlife recently installed two fire diptanks in Ka'ohe (Geometrician 2013), one of which is situated adjacent to the proposed Palila Forest Discovery Trail location (Figure 8). The graded level area between the upper and lower components of the diptank will be used by trail goers for parking (see Figure 6). The EA prepared for the diptanks (Geometrician 2013:12-13) summarizes the plight of the critically endangered *palila*:

> . . . The Palila is the last extant representative of the finch-billed clade of Hawaiian Honeycreepers (Drepanidae) found on the main Hawaiian Islands. While fossil evidence shows that the species was formerly widespread on multiple islands at all elevations (Olson and James 1982), historically the species has been restricted to the māmane-naio forests at high elevation on the Island of Hawai'i. Over the 20th century, Palila disappeared from its historic range on Mauna Loa, Hualalai, and most of Mauna Kea, with the remaining population undergoing a steady decline over the past decade (Leonard et al. 2008, Camp and Banko 2012). The most recent estimate shows that about 2,200 Palila survive in degraded forest on the southwestern slope of Mauna Kea (Camp and Banko 2012).
>
> The Palila was listed by the USFWS as endangered in 1967 (USFWS 1967) and critical habitat was designated in 1977 (USFWS 1977). The area designated as critical habitat encircles Mauna Kea from about 5,500 feet in elevation to 10,000 feet in elevation, encompassing an area of 24,357 ha (hectares). At least 95 percent of the Palila population occurs within a core area of about 7,200 ha on the southwest slope from 6,500 feet in elevation to 9,500 feet in elevation. Protecting the remaining forest in this area from the threat of fire is critical for the short and long-term survival of the species.
>
> Palila have evolved into an extremely specialized bird dependent for its survival on māmane trees and associated invertebrates. Few other birds in the world are so highly specialized in their diet and therefore, their habitat requirements. Māmane seeds and flowers must be available throughout the year in order to sustain Palila populations, as approximately 90% of their diet is derived from these trees. Insects provide additional protein for growth and survival of the young, with caterpillars serving as the chief insect prey items of Palila. Most of the caterpillars consumed are found within māmane pods. Breeding effort (number of pairs attempting to nest) and success (number of fledglings produced) of Palila depend heavily on the availability of māmane seeds and supplemental insect foods.
>
> Large māmane trees can produce many more resources (seeds, flowers, insects, nest sites) than small trees and are preferred by Palila. Elevational and rainfall gradients result in food resources being available to Palila in relatively large quantities throughout the year. Where elevation and rainfall gradients are substantial, māmane flowers (and the seeds that follow) are produced in large quantities at higher elevations first (where rainfall is higher) and at lower elevations later (where rainfall is lower). Palila respond to this changing availability of food by moving up and down the mountain, following the available food resources. Where elevation and rainfall gradients are insignificant, māmane seeds and flowers are produced in large quantities usually only once a year and are relatively scarce the rest of the year. Therefore, habitats best able to sustain Palila in the long term are large areas of forest that contain dense stands of large māmane trees and incorporate significant elevational or rainfall gradients. Habitat restoration is ongoing in the Ka'ohe Mitigation Area, as well as at Pu'u Mali on the north slope of Mauna Kea, both of which were created from the withdrawal of grazing leases as part of mitigation for the Saddle Road Improvements project . . .

The Palila Forest Discovery Trail will provide the first and only means of public interpretation of the high-elevation dry forest and *palila* habitat found on Mauna Kea. The proposed trail route (see Figures 3), which is designed for hiking activities, will include trail building and access improvements, informational signage and kiosks, and a restroom (Clivus-style composting toilet). The current study area (see Figure 6) includes the aforementioned, roughly 0.25-acre, parking location adjacent to Road R-1 (on the graded surface between the two components of the newly installed fire diptank), an approximately 1.5-kilometer (0.93-mile) long corridor (5 meters wide) for the construction

of the loop trail, some grassy areas adjacent to the proposed trail route where forest restoration (replanting) will occur, and a roughly 0.05-acre, previously graded, location adjacent to Pu'u La'au where the composting toilet will be placed. The loop trail will extend north and west from a fence along the northern edge of the parking area to a scenic viewpoint at the northern extent of the study area, then meander back to the east, past the restroom facility, to a second scenic viewpoint on top of Pu'u La'au, finally returning to the south and west back to the parking area. All trail work will be completed by hand using only hand tools (i.e. shovels, picks, chainsaws, weed-whackers, etc.). Some portions of the trail will follow existing bulldozer cuts (old roads and firebreaks), while other portions will be newly created by moving rocks out of the trail path to the trail edge and leveling the trail bed; where the trail traverses steeper terrain, stairs will be created using natural materials.

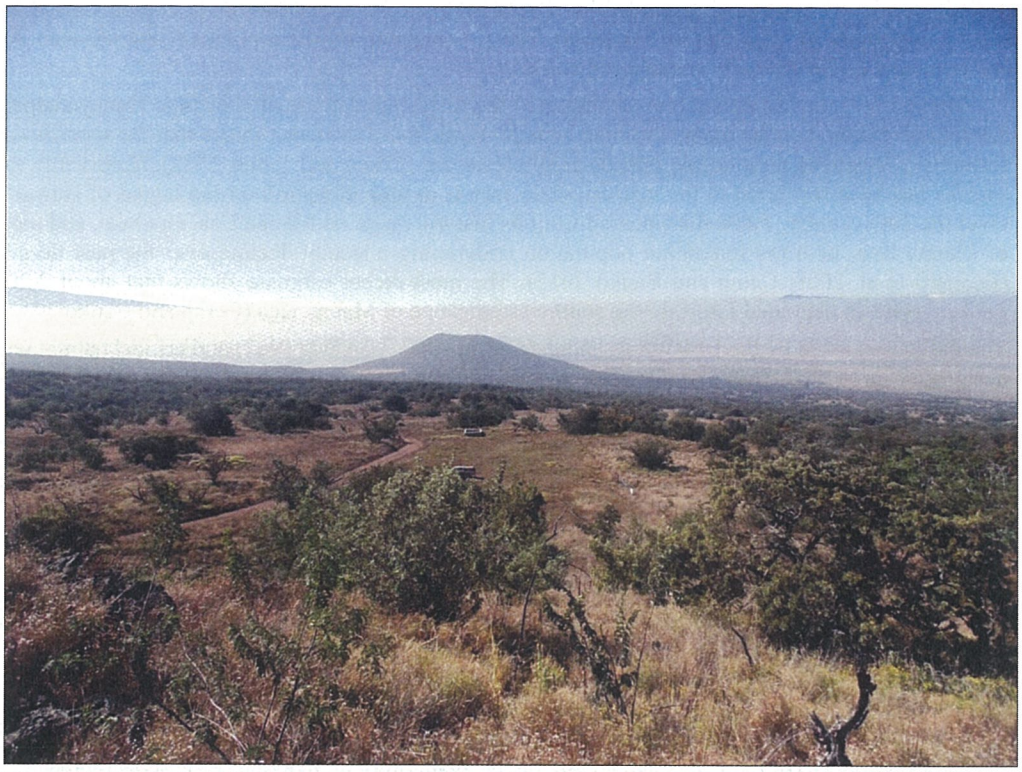


Figure 8. Newly installed fire diptank at the location of the proposed parking area for the Palila Forest Discovery Trail, view to the southeast.

While the previous use of the current study area for pasture has impacted the existing vegetation pattern, mechanically disturbed areas along the trail route are limited to the proposed parking location, an old fire break road that follows a fence line northeast from the recent disturbance caused by the construction of the fire diptank to Road R-1, and an old quarry road that extends to the summit of Pu'u La'au where extensive quarrying activity has occurred in the past. The quarrying of cinder has removed the eastern portion of the *pu'u* (Figure 9) and created large areas of disturbance to the east and south of the landform where the restroom facility will be located (Figure 10). The proposed restroom location is adjacent to the fence marking the boundary of the Mauna Kea Forest Reserve, near a hunter check-in kiosk and the State-owned Pu'u La'au cabin (Figure 11). This Historic cabin, built by the Civilian Conservation Corps (CCC) during the 1930s (Maly and Maly 2005), is located on the adjacent State-owned parcel to the east of the study area (TMK: (3) 4-4-015:001) within the forest reserve. The cabin location also includes a water tank and outhouse (Figure 12). Placement of the proposed composting toilet in relatively close proximity to the cabin will help deter trail goers from using the existing facilities at this Historic structure. In an effort to maintain the integrity of the setting, the proposed Clivus-style toilet will be placed by a stand of large trees that will block the view plane from the cabin, and the proposed trail route will direct hikers off of the existing 4WD road, away from the cabin, back to the parking area.



Figure 9. Road leading to the summit of Pu'u La'au, view to the northwest.

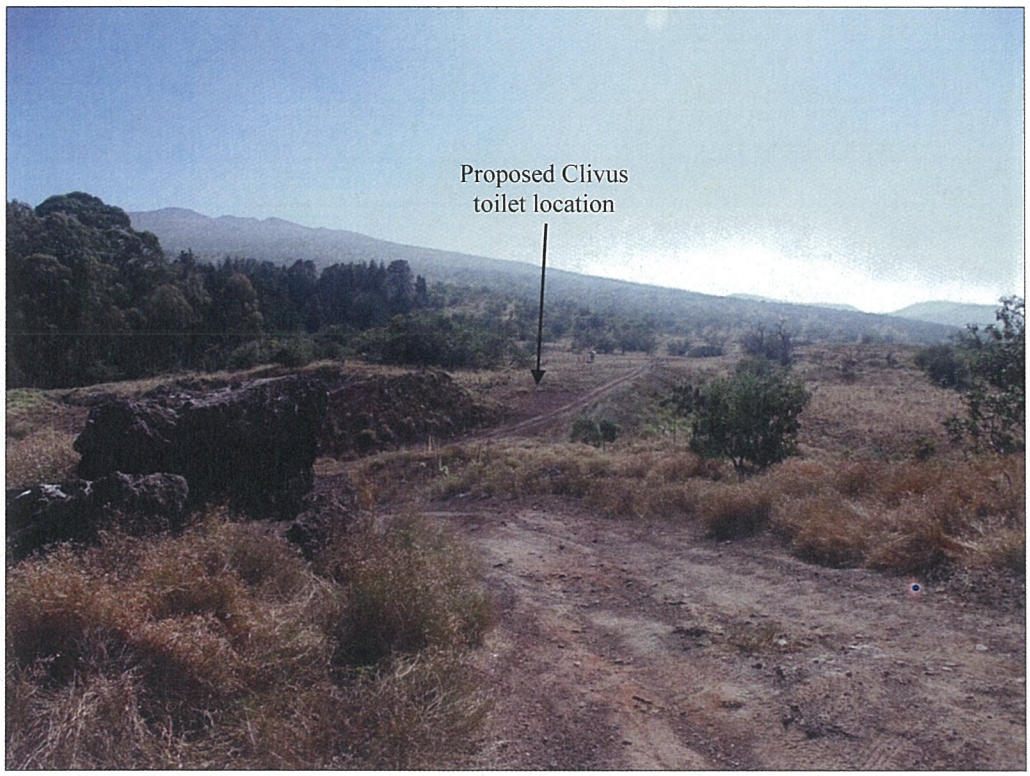


Figure 10. Proposed Clivus-style toilet location, view to the southeast from the summit of Pu'u Lu'au.



Figure 11. Mauna Kea Forest Reserve fence and hunter check-in kiosk, view to the northeast.



Figure 12. Pu‘u La‘au cabin within the Mauna Kea Forest Reserve, view to the northeast.

2. BACKGROUND

To generate a set of expectations regarding the nature of cultural resources that might be encountered within the study area, and to establish an environment within which to assess the significance of any such resources, a brief culture-historical background is presented. This section of the report includes a synthesis of prior archaeological and historical research relevant to the current study area.

CULTURE-HISTORICAL CONTEXT

The current study area is located on the southwestern slope of Mauna Kea in Ka'ohe 3 Ahupua'a within the inland portion of the Hāmākua District (Figure 13). Although the boundaries of the Hāmākua District, one of six traditional districts on the Island of Hawai'i, are strictly political, the lands encompassed by it possess a unique environment that played a large role in determining the boundaries and shaping its history from the time of Polynesian settlement to the modern day. Understanding this environment is important for understanding the history of the current study area:

> Hāmākua district is a windward district in the truest sense. It has ca. 29 miles of shoreline, primarily focused on Mauna Kea's eastern slopes with exposed cliffs, rough seas, and narrow reef formations. Above the sea cliffs, the gentle slopes have a thick soil cover and abundant rainfall, and lush vegetation, with the upper slopes from 1,000-6,000 feet in an *'ōhi'a-koa* rain forest. The slopes are cut by deep (up to 300-foot), narrow stream gulches cloaked with *kukui* and pandanus. Yet Hāmākua is more than these slope and gulch lands. It also includes the extremely large, deep valleys of Waipi'o and Waimanu which have cut over a millennia into the older Kohala Mountain, valleys which ... dominated the history of the district and the island. Hāmākua also extended inland, encompassing the high elevation *māmane-naio* forests of Mauna Kea and the subalpine, oft snow-covered, summit itself. The district continued across the foggy and cold upland plateau or Saddle with its terrain a mixture of bare lava and soils, and with its vegetation a mixture of *'ōhi'a* and *māmane-naio* forests. This plateau had important nesting grounds of *'u'au* and *nēnē*. And, Hāmākua virtually spanned the island-reaching to and looking down into the upper edges of Kona. [Cordy 2000:21]

It was to this general environmental setting that the first Polynesians in Hawai'i arrived. Over generations they shaped and utilized the natural environment to provide all they needed for sustenance and survival. In the process they created a uniquely Hawaiian culture that was wholly adapted to the environment. The brief generalized cultural sequence that follows below provides a time frame for the peopling of Hawai'i, the development of Hawaiian culture, the expansion and intensification of the Hawaiian population, and the resulting stresses on it from the earliest Polynesian settlers to the time of European Contact.

A Generalized Model of Hawaiian Prehistory

The generalized cultural sequence that follows is based on Kirch's (1985) model, and amended to include recent revisions offered by Kirch (2011) and Athens et al. (2014). The conventional wisdom has been that first inhabitants of Hawai'i Island probably arrived by at least A.D. 300, and focused habitation and subsistence activity on the windward side of the island (Burtchard 1995; Kirch 1985; Hommon 1986). However, there is no archaeological evidence for occupation of Hawai'i Island (or perhaps anywhere in Hawai'i) during this initial settlement, or colonization stage of island occupation (A.D. 300 to 600). More recently, Kirch (2011) and Athens et al. (2014) have convincingly argued that Polynesians may not have arrived to the Hawaiian Islands until at least A.D. 1000, but expanded rapidly thereafter. The implications of this on the currently accepted chronology would alter the timing of the Settlement, Developmental, and Expansion Periods, possibly shifting the Settlement Period to A.D. 1000 to 1100, the Developmental Period to A.D. 1100 to 1350, and the Expansion Period to A.D. 1350 to 1650.

The initial settlement in Hawai'i is believed to have occurred from the southern Marquesas Islands. This was a period of great exploitation and environmental modification, when early Hawaiian farmers developed new subsistence strategies by adapting their familiar patterns and traditional tools to their new environment (Kirch 1985; Pogue 1978). Their ancient and ingrained philosophy of life tied them to their environment and kept order. Order was further assured by the conical clan principle of genealogical seniority (Kirch 1984). According to Fornander (1969), the Hawaiians brought from their homeland certain universal Polynesian customs: the major gods Kāne, Kū, and Lono; the *kapu* system of law and order; cities of refuge; the *'aumakua* concept; various epiphenomenal beliefs; and the concept of *mana*. Initial permanent settlements in the islands were established at sheltered bays with access to fresh water and marine resources. Communities shared extended familial relations and there was an occupational focus on the collection of marine resources.

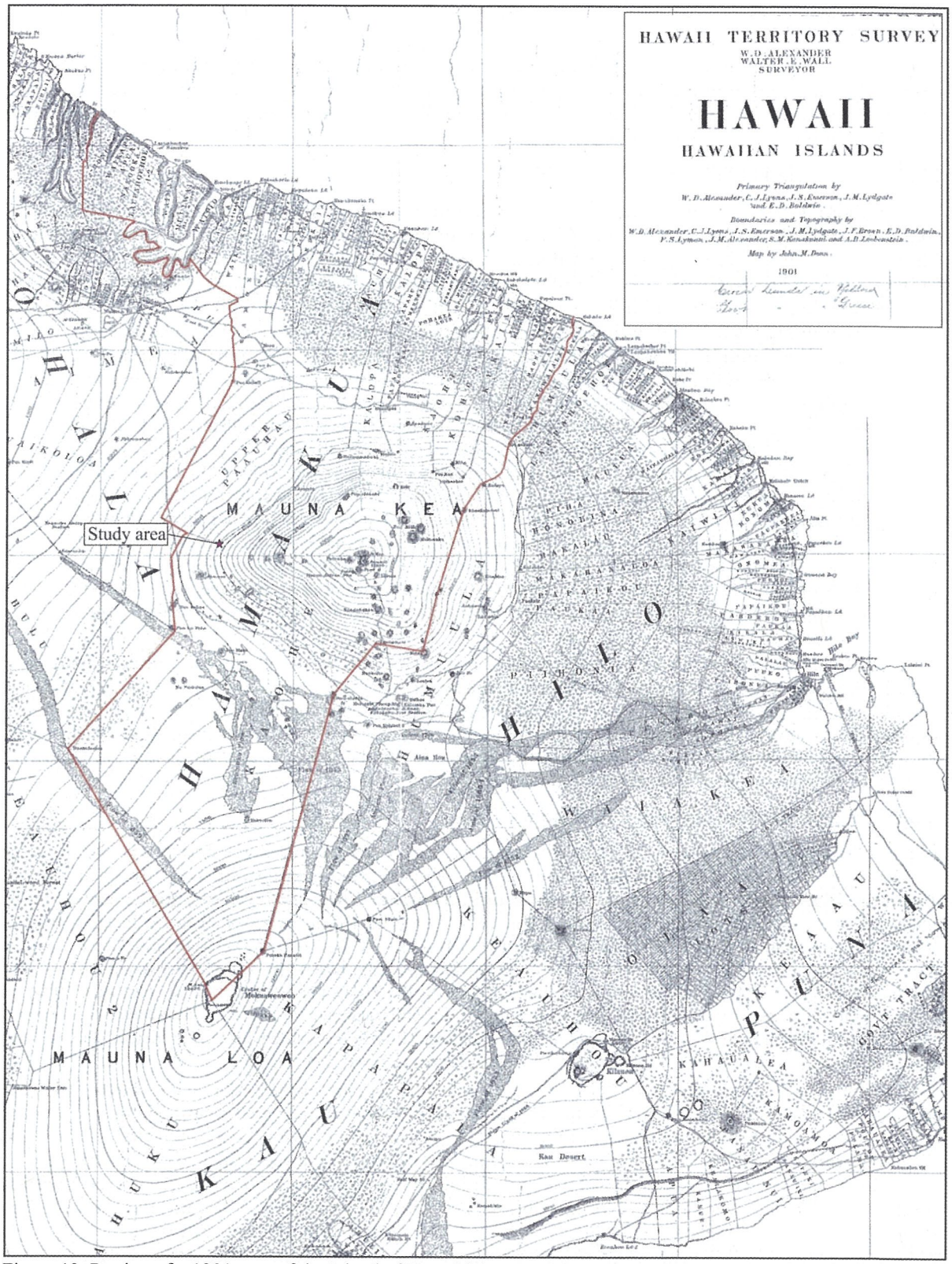


Figure 13. Portion of a 1901 map of the Island of Hawai'i (prepared by John M. Dunn) showing the boundaries of the Hāmākua District (in red) and the location of the current study area.

Over a period of several centuries the areas with the richest natural resources became populated and perhaps even crowded, and there was an increasing separation of the chiefly class from the common people. As the environment reached its maximum carrying capacity, the result was social stress, hostility, and war between neighboring groups (Kirch 1985). Soon, large areas of Hawai'i were controlled by a few powerful chiefs.

The Development Period brought about a uniquely Hawaiian culture. The portable artifacts found in archaeological sites of this period reflect not only an evolution of the traditional tools, but some distinctly Hawaiian inventions. The adze (*ko'i*) evolved from the typical Polynesian variations of plano-convex, trapezoidal, and reverse-triangular cross-section to a very standard Hawaiian rectangular quadrangular tanged adze. A few areas in Hawai'i produced quality basalt for adze production. The summit region of Mauna Kea, above the current study area, was a well-known adze quarry. The two-piece fishhook and the octopus-lure breadloaf sinker are Hawaiian inventions of this period, as are *'ulu maika* stones and *lei niho palaoa*. The later was a status item worn by those of high rank, indicating a trend toward greater status differentiation (Kirch 1985).

The Expansion Period is characterized by the greatest social stratification, major socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. The greatest population growth occurred during the Expansion Period. Subsistence patterns intensified as crop farming evolved into large irrigated field systems and expanded into the marginal dry land areas. The *loko* or fishpond aquaculture flourished during this period (Bellwood 1978; Kirch 1985).

It was during the Expansion Period that a second major migration settled in Hawai'i, this time from Tahiti in the Society Islands. According to Kamakau (1976) the *kahuna* Pā'ao settled in the islands during the 13th century. Pā'ao was the keeper of the god Ku'ka'ilimoku, and had fought bitterly with his older brother, the high priest Lonopele. After much tragedy on both sides, Pā'ao was expelled from his homeland by Lonopele. He prepared for a long voyage, and set out across the ocean in search of a new land. On board Pā'ao's canoes were thirty-eight men (*kānaka*), two stewards (*kānaka 'ā'īpu'upu'u*), the chief Pilika'aiea (Pili) and his wife Hina'aukekele, Nāmau'u o Malaia, the sister of Pā'ao, and the prophet Makuaka'ūmana (Kamakau 1991). In 1866 Kamakau (1991:100-102) told the following story of their arrival in Hawai'i:

> Puna on Hawai'i Island was the first land reached by Pā'ao, and here in Puna he built his first heiau for his god Aha'ula and named it Aha'ula [Waha'ula]. It was a luakini. From Puna, Pā'ao went on to land in Kohala, at Pu'uepa. He built a heiau there called Mo'okini, a luakini.
>
> It is thought that Pā'ao came to Hawai'i in the time of the ali'i La'au because Pili ruled as mo'i after La'au. You will see Pili there in the line of succession, the mo'o kū'auhau, of Hanala'anui. It was said that Hawai'i Island was without a chief, and so a chief was brought from Kahiki; this is according to chiefly genealogies. Hawai'i Island had been without a chief for a long time, and the chiefs of Hawai'i were ali'i maka'āinana or just commoners, maka'āinana, during this time.
>
> . . . There were seventeen generations during which Hawai'i Island was without chiefs—some eight hundred years. . . . The lack of a high chief was the reason for seeking a chief in Kahiki, and that is perhaps how Pili became the chief of Hawai'i. He was a chief from Kahiki and became the ancestor of chiefs and people of Hawai'i Island.

The Pili line's initial ruling center was likely in Kohala, but Cartwright (1933) suggests that Pili resided in and ruled from Waipi'o Valley in the Hāmākua District. Ethnohistorical traditions (Fornander 1880) indicate that valley was associated with at least nine successive Pili line rulers of Hawai'i Island, from Kaha'imoele'a to Umi (from roughly A.D. 1460 to 1620). Prior to the establishment of these Pili rulers, Waipi'o was the residential base for powerful local rulers dating back to at least the A.D. 1200s (Cartwright 1933).

The concept of the *ahupua'a* was established during the A.D. 1400s (Kirch 1985), adding another component to a then well-stratified society. This land unit became the equivalent of a local community, with its own social, economic, and political significance. *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or lesser chiefs; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land, which was managed by a *konohiki*. *Ahupua'a* were usually wedge or pie-shaped, incorporating all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986). Ka'ohe, however, is one of two large *ahupua'a* in eastern Hāmākua (the other being Pā'ahau) that were created above the upper gulches of the windward *ahupua'a* to manage special resources such as those found in the *māmane* forests and the high-altitude regions of Mauna Kea. The bulk of Ka'ohe encompasses these upland resources, and like its neighboring North Hilo *ahupua'a* of Humu'ula (see Figure 13), it rises above its narrow coastal band, "engulfing all the other inland areas of Hāmākua—including the rest of Mauna Kea's upper slopes and its summit and all the Interior

Plateau" (Cordy 1994:12). Curtis Lyons (1875:111; quoted in Maly and Maly 2005) described the special relationship of native tenants of Ka'ohe to the mountain lands:

> The ordinary ahupuaa extends from half a mile into this [forest] belt. Then there are larger ahupuaas which are wider in the open country than others, and on entering the woods expand laterally so as to cut off all the smaller ones, and extend toward the mountain till they emerge to the open interior country; not however to converge to a point at the tops of the respective mountains. Only a rare few reach those elevations, sweeping past the upper ends of all the others, and by virtue of some privilege in bird-catching, or some analogous right, taking the whole mountain to themselves...the whole main body of Mauna Kea belongs to one land from Hamakua, vis., Kaohe, to whose owners belong the sole privilege of capturing the ua'a [*sic*], a mountain-inhabiting but sea-fishing bird.

Ahupua'a names often invoke history, legend, important people or resources found within them. The name "Ka'ohe" translates literally as "the bamboo" (Pukui et al. 1974:84-85). Unlike other lower-elevation places that share this name (e.g., an *ahupua'a* of the same name in South Kona), the bamboo to which the name refers is not meant to invoke vegetation, but rather is associated with the transportation of water. Dr. Pualani Kanahele (quoted in Meyer 2003:172-173) has elaborated on this meaning of Ka'ohe in the context of modern military activities at the U.S. Army Pohakuloa Training Area:

> ... one of the earlier reasons for bamboo was to transport water. So what does that relationship, Ka'ohe, have to do with water? And so, the idea that part of the land may be producing a lot water...the tops of the mountains were important to the kupuna's because that's where the water would go into the earth, seep into the earth...and then come out. So, now they're bombing up there and that's detrimental to our water source, higher source.

The *ali'i* and the *maka'āinana* (commoners) were not confined to the boundaries of the *ahupua'a*; when there was a perceived need, they also shared with their neighbor *ahupua'a ohana* (Hono-ko-hau 1974). The *ahupua'a* were further divided into smaller sections such as the *'ili, mo'o'aina, pauku'aina, kihapai, koele, hakuone*, and *kuakua* (Hommon 1986, Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mō'ī* (king). *Heiau* building flourished during the Expansion Period as religion became more complex and embedded in a sociopolitical climate of territorial competition. Monumental architecture, such as *heiau*, "played a key role as visual markers of chiefly dominance" (Kirch 1990:206). Waipi'o was one of the most important religious and chiefly centers on the Island of Hawai'i, and a number of large *heiau* were maintained in the valley throughout the Precontact Period (Cordy 1994).

Līloa and his son 'Umi were two of the most renowned rulers of the Pili line. Both were from Hāmākua and had their ruling centers in Waipi'o (Cordy 1994). 'Umi, who is often credited with uniting the island of Hawai'i under one rule, had a chiefly father (Līloa) and a mother (Akahi) who was a commoner (Kamakau 1992). Līloa met Akahi when he secretly left the valley to visit his other Hāmākua lands. As a young boy 'Umi was raised in the countryside by his mother, but he soon moved to Waipi'o to reside with his father and learn the chiefly ways (Kamakau 1992). Waipi'o remained a leading chiefly center until the end of 'Umi's reign around ca. 1620 (Cordy 1994).

Kirch (1985) places the beginning of the Proto-Historic Period during the rule of Lonoikamakahiki. This was a time marked by both political intensification and stress and continual conquest by the reigning *ali'i*. Wars occurred regularly between intra-island and inter-island polities during this period. It was during this time of warfare that Kamehameha, who would eventually rise to power and unite all the Hawaiian Islands under one rule, was born in the District of North Kohala on the Island of Hawai'i (Kamakau 1992). There is some controversy about the year of his birth, but Kamakau (1992:66-68) places the birth event sometime between A.D. 1736 and 1758, most likely nearer to the later date. This period was one of continual conquest by the reigning *ali'i*. In A.D. 1775 Kalani'ōpu'u and his forces, who had already conquered Hana in eastern Maui, raided and destroyed the neighboring Kaupō District, then launched several more raids on Moloka'i, Lāna'i, Kaho'olawe, and parts of West Maui. It was at the battle of Kalaeoka'ilio that Kamehameha, a favorite of Kalani'ōpu'u, was first recognized as a great warrior and given the name of Pai'ea (hard-shelled crab) by the Maui chiefs and warriors (Kamakau 1992).

HISTORY AFTER CONTACT

Captain James Cook landed in the Hawaiian Islands on January 18, 1778. Ten months later, on a return trip to Hawaiian waters, Kalani'ōpu'u, who was at war with Kahekili, visited Cook on board the *Resolution* off the East coast of Maui. Kamehameha observed this meeting, but chose not to participate. The following January [1779], Cook and Kalani'ōpu'u met again in Kealakekua Bay and exchanged gifts. In February, Cook set sail intending to leave the Hawaiian Islands; however, a severe storm off the Kohala coast damaged a mast and he was forced to return to

Kealakekua. Cook's return occurred at an inopportune time, and this misfortune cost him his life (Kuykendall and Day 1976).

Around A.D. 1780 Kalani'ōpu'u proclaimed that his son Kiwalao would be his successor, and he gave the guardianship of the war god Kū'kā'ilimoku to Kamehameha. Many chiefs, concerned about their land claims, which Kiwalao did not seem to honor, preferred Kamehameha as the next ruler. Encouraged by these chiefs Kamehameha usurped Kiwalao's authority during a sacrificial ritual in Ka'ū. He then withdrew to his home district of Kohala where he farmed the land, growing taro and sweet potatoes (Handy and Handy 1972). After Kalani'ōpu'u died in A.D. 1782 civil war broke out, Kiwalao was killed, and Kamehameha became the ruler of Hawai'i Island. The wars between Maui and Hawai'i continued until A.D. 1795 (Kuykendall and Day 1976; Handy and Handy 1972). Several battles were fought in the Hāmākua District during this period, and many of the religious structures in Waipi'o Valley were destroyed (Hazlett et al. 2007).

In 1793-1794 Captain George Vancouver, who had previously visited Hawai'i with Cook in 1778-1779, returned leading his own expedition. Archibald Menzies (1920:51), a naturalist and surgeon with the Vancouver expedition, wrote the following description of the Hāmākua District in 1793 as he sailed off the coast:

> The land we passed in the forenoon rose in a steep bank from the water side and from thence the country stretched back with an easy acclivity for about four or five miles, and was laid out into little fields, apparently well cultivated and interspersed with the habitations of the natives. Beyond this the country became steeply rugged and woody, forming mountains of great elevation.

It was on this voyage that Vancouver first introduced cattle to the Island of Hawai'i, giving 17 head to King Kamehameha as a gift (Barrére 1983). Kamehameha placed a *kapu* on the cattle, and they were driven to the upland plain of Waimea to increase and multiply (Vancouver in Kuykendall 1938). Inevitably, some escaped and made their way to the mountain lands of Ka'ohe, where they would later play an important role in land use for much of the nineteenth and early twentieth centuries.

Demographic trends during the early Contact Period indicate population reduction in some areas, due to war and disease, yet increase in others, with relatively little change in material culture. There was a continued trend toward craft and status specialization, intensification of agriculture, *ali'i* controlled aquaculture, upland residential sites, and the enhancement of traditional oral history. The Kū cult, *luakini heiau*, and the *kapu* system were at their peaks, although Western influence was already altering the cultural fabric of the Islands (Kirch 1985; Kent 1983). Foreigners had introduced the concept of trade for profit, and by the end of the 1700s, Hawai'i saw the beginnings of a market system economy (Kent 1983). This marked the end of the Proto-Historic Period and the end of an era of uniquely Hawaiian culture.

Hawai'i's culture and economy continued to change drastically as capitalism and industry established a firm foothold during the Historic Period. The sandalwood (*Santalum ellipticum*) trade, established by Euro-Americans in 1790 and turned into a viable commercial enterprise by 1805 (Oliver 1961), was flourishing by 1810. This added to the breakdown of the traditional subsistence system, as farmers and fishermen were ordered to spend most of their time logging, resulting in food shortages and famine that led to population decline. Kamehameha did manage to maintain some control over the trade (Kuykendall and Day 1976; Kent 1983). Evidence of sandalwood harvesting in the Saddle region includes sandalwood bundles recorded archaeologically in a lava tube in the western PTA near the North Kona-Hāmākua border by Shapiro and Cleghorn (1998:48).

By 1796 Kamehameha, with the aid of foreign weapons and advisors, had conquered all of the island kingdoms except Kaua'i. In 1810, when Kaumuali'i of Kaua'i gave his allegiance to Kamehameha, the Hawaiian Islands were unified under a single rule (Kuykendall and Day 1976). Kamehameha would go on to rule the islands for another nine years. He and his high chiefs participated in foreign trade, but continued to enforce the rigid *kapu* system.

Kamehameha I died in 1819 at Kamakahonu in Kailua-Kona. With the passing of Kamehameha, his heir Liholiho was given the name of Kamehameha II. Ka'ahumanu, the favorite wife of Kamehameha, announced the last commands of Kamehameha I:

> O heavenly one! I speak to you the commands of your grandfather. Here are the chiefs; here are the people of your ancestors; here are your guns; here are your lands. But we two shall share the rule over the land. Liholiho consented and became ruling chief over the government. [Kamakau 1992:220]

Following the death of a prominent chief, it was customary to remove all of the regular *kapu* that maintained social order and the separation of men and women and elite and commoner. Thus, following Kamehameha's death a

period of *'ai noa* (free eating) was observed along with the relaxation of other traditional *kapu*. It was for the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history traditional customs changed:

> The death of Kamehameha was the first step in the ending of the tabus; the second was the modifying of the mourning ceremonies; the third, the ending of the tabu of the chief; the fourth, the ending of carrying the tabu chiefs in the arms and feeding them; the fifth, the ruling chief's decision to introduce free eating (*'ainoa*) after the death of Kamehameha; the sixth, the cooperation of his aunts, Ka-ahu-manu and Ka-heihei-malie; the seventh, the joint action of the chiefs in eating together at the suggestion of the ruling chief, so that free eating became an established fact and the credit of establishing the custom went to the ruling chief. This custom was not so much of an innovation as might be supposed. In old days the period of mourning at the death of a ruling chief who had been greatly beloved was a time of license. The women were allowed to enter the heiau, to eat bananas, coconuts, and pork, and to climb over the sacred places. You will find record of this in the history of Ka-ula-hea-nui-o-ka-moku, in that of Ku-ali'i, and in most of the histories of ancient rulers. Free eating followed the death of the ruling chief; after the period of mourning was over the new ruler placed the land under a new tabu following old lines. [Kamakau 1992:222]

Immediately upon the death of Kamehameha I, Liholiho was sent away to Kawaihae to keep him safe from the impurities of Kamakahonu brought about by the death of Kamehameha. After purification ceremonies Liholiho returned to Kamakahonu:

> Then Liholiho on this first night of his arrival ate some of the tabu dog meat free only to the chiefesses; he entered the *lauhala* house free only to them; whatever he desired he reached out for; everything was supplied, even those things generally to be found only in a tabu house. The people saw the men drinking rum with the women *kahu* and smoking tobacco, and thought it was to mark the ending of the tabu of a chief. The chiefs saw with satisfaction the ending of the chief's tabu and the freeing of the eating tabu. The *kahu* said to the chief, "Make eating free over the whole kingdom from Hawaii to Oahu and let it be extended to Kauai!" and Liholiho consented. Then pork to be eaten free was taken to the country districts and given to commoners, both men and women, and free eating was introduced all over the group. Messengers were sent to Maui, Molokai, Oahu and all the way to Kauai, Ka-umu-ali'i consented to the free eating and it was accepted on Kauai. [Kamakau 1992:225]

When Liholiho, Kamehameha II, ate the *kapu* dog meat, entered the *lauhala* house and did whatever he desired it was still during a time when he had not reinstituted the eating *kapu* but others appear to have thought otherwise. Kekuaokalani, caretaker of the war god Kū'kā'ilimoku, was dismayed by his cousin's (Liholiho) actions and revolted against him, but was defeated.

With an indefinite period of free-eating and the lack of the reinstatement of other *kapu* extending from Hawai'i to Kaua'i, and the arrival of the Christian missionaries shortly thereafter, the traditional religion had been officially replaced by Christianity within a year following the death of Kamehameha I. By December of 1819 Kamehameha II had sent edicts throughout the kingdom renouncing the ancient state religion, ordering the destruction of the *heiau* images, and ordering that the *heiau* structures be destroyed or abandoned and left to deteriorate. He did, however, allow the personal family religion, the *'aumakua* worship, to continue (Oliver 1961; Kamakau 1992). With the end of the *kapu* system changes in the social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O'ahu, lessening the burden of resource procurement for the chiefly class on the residents of Hawai'i Island. Some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods that they could trade with early Western visitors. Introduced foods often grown for trade included yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845).

In October of 1819, seventeen Protestant missionaries had set sail from Boston to Hawai'i. They arrived in Kailua-Kona on March 30, 1820 to a society with a religious void to fill. Many of the *ali'i,* who were already exposed to western material culture, welcomed the opportunity to become educated in a western style and adopt their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government. During this period, the sandalwood trade was wreaking havoc on the commoners, who were weakening with the heavy production, exposure, and famine just to fill the coffers of the *ali'i* who were no longer under any traditional constraints (Oliver 1961; Kuykendall and Day 1976). In 1823 the Reverend William Ellis (2004:405-406), one of the early missionaries, wrote:

> About eleven at night we reached Towaihae [Kawaihae], where we were kindly received by Mr. Young. . . . Before daylight on the 22nd, we were roused by vast multitudes of people passing

> through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts.

Another early industry with ties to the mountain lands in Ka'ohe grew out of Captain Vancouver's gift of cattle to Kamehameha I. By the time of Kamehameha's death in 1819, the monarchy allowed a few men to hunt the feral cattle that had spread around Hawai'i Island. These individuals, known as 'bullock hunters,' were mostly foreigners working individually to provide salted beef for native-owned vessels (Bergin 2004:31; Ellis 2004:291, Mills 2003). Like sandalwood, the major impetus for bullock-hunting was the export of raw materials, in this case, the hides and tallow of Hawai'i's cattle to leather goods factories in New England (Fischer 2007; Mills et al. 2013; Wellmon 1969). In the early 1830s, a few *vaqueros* who perfected methods of capturing wild cattle on horseback in Alta California began working for the Hawaiian monarchy. Spanish styles of hunting wild cattle avoided the use of guns (Hobbs 1939:97-98), and was more efficient than killing and skinning cattle in the mountain uplands where they roamed. Hawaiian cowboys, trained by the *vaqueros*, appropriated and adapted much of their equipment including the braided lariat, broad winged and hooded stirrups (*tapaderos*), and highly adorned saddles with large horns to conditions in Hawai'i (Hobbs 1939:95). Bullock-hunting continued in the mountain lands through the next decade, when dramatic changes in Hawai'i's land tenure system to spur the development of ranching into Ka'ohe.

Ka'ohe Ahupua'a and the Māhele 'Āina of 1848

By the mid-nineteenth century, the ever-growing population of Westerners in Hawai'i forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership, and in 1848 the *Māhele 'Āina* became the vehicle for determining ownership of native lands. This change in land tenure was promoted primarily by the missionaries and Western businessmen in the island kingdom. Generally these individuals were hesitant to enter business deals on leasehold land. The *Māhele* (division) defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *konohiki*. During the *Māhele*, all lands in the Kingdom of Hawai'i were placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) *Konohiki* Lands (Chinen 1958:vii, 1961:13). The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission. As a result of the *Māhele*, Ka'ohe was awarded to, then relinquished by, Victoria Kamamalu to Kamehameha III (*Buke Māhele* 1848:5-6), and then relinquished by the *Mō'ī* to become Government Land (*Buke Māhele* 1848:191).

All lands awarded during the *Māhele* were subject to the rights of the native tenants therein; those individuals who lived on the land and worked it for their subsistence and the welfare of the chiefs (Sinoto and Kelly 1970). Native tenants could claim, and acquire title to, *kuleana* parcels that they actively lived on or farmed at the time of the *Māhele*. The Kuleana Act of December 21, 1849 provided the framework by which native tenants could apply for and receive fee-simple interest in their *kuleana* lands from the Land Commission. The Board of Commissioners over saw the program and administered the lands as Land Commission Awards (LCAw.). Not all lands that were claimed were awarded. A review of the Waihona 'Āina Database indicates that in Ka'ohe, four native claims were registered in the windward, lower-elevation portion of the *ahupua'a*, and none in the saddle region. Only one lower-elevation claim was awarded (Table 1), a 7-acre *'āpana* awarded to Koolau.

Table 1. *Kuleana* claims in Ka'ohe Ahupua'a

LCAw. #	*Claimant*	*'Āpana Claimed*	*Awarded*	*Acres*
08297	Kookooku	1 potato *kīhāpai*	No	-
10180	Malalo, Tatina	1, use not described	No	-
03705B	Koolau	1 houselot with two houses, 2 taro *kīhāpai*, 1 potato *kīhāpai*, 1 *kīhāpai* in banana and coffee.	1	7
03722B	Keopohaku	20 *'āpana*, including houses, taro, *māmaki*, coffee, *wauke*, potato, cane, and banana	No	-

Ka'ohe 3 Ahupua'a Land Tenure during the Second Half of the Nineteenth Century

The activities of the *Māhele* ushered in changes in the traditional Hawaiian land tenure system that enabled foreigners to purchase lands which had previously been unavailable to them. As a few individuals and companies involved in the hide and tallow trade began to acquire private herds in the mid to late 1800s, bullock-hunting in Hawai'i began to give way to livestock ranching. While Ka'ohe was not for sale, the entirety of its mountain lands was leased to Francis Spencer in 1857. Ranching proper began in 1859, when Francis Spencer of Waimea and his business partner Robert Janion of Liverpool, England, obtained leases on grazing lands in Ka'ohe and Humu'ula. Their partnership evolved into the Waimea Grazing and Agricultural Company (WGAC) with Janion and W.L. Green of Honolulu as sole stockholders. The neighboring *ahupua'a* of Pā'auhau (37,888 acres) was purchased in 1861 by John P. Parker, the founder of Parker Ranch, as Grant No. 2769. In the Royal Patent granted to Parker, a large flat rock marked XIV on the summit of the conical hill known as Puulaau is noted as the southeastern corner of that *ahupua'a* (Maly and Maly 2005:353).

In 1862 the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i to legally set the boundaries of the *ahupua'a* that were awarded during the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries was authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of whom had also been claimants for *kuleana* during the *Māhele*. Because Ka'ohe was Government land, it was not surveyed explicitly by the Boundary Commission; rather, the surveys of the surrounding *ahupua'a* of Humu'ula, Pā'auhau, and Keauhou established the Ka'ohe boundaries (see records cited in Maly and Maly 2005). By 1871, the WGAC was doing poorly, and Janion and Green sold out to a Dr. Robert M. Kibbin of Honolulu in 1871. On June 5, 1871, John Parker II outbid the WGAC for the lease on Ka'ohe when it came up for renewal.

An interesting and culturally significant event occurred in the vicinity of the Pu'u La'au area in 1882 when the Dowager Queen Emma (Rooke) Kaleleonalani, made an ascent of Mauna Kea to see, and bathe in, the waters of Lake Waiau. The trip was recounted in the native newspaper Kuokoa on October 14, 1882, which was translated by Maly and Maly (2005:155). In a 1967 interview (by Larry Kimura; transcribed in Maly and Maly 2005:161) Kalani Ka'apuni-Phillips stated the following concerning the Queen's journey from Waimea to the mountain:

> Queen Emma was a good horsewoman....she could choose which ever horse she was interested in. Waimea had many horses to choose from. They went up to this place called Kahalala'au (Pu'u Lā'au)....At that time, there was great rain, and no shelter. So these people with your renowned elder, they broke the leafing branches of the māmane. They made a house for Queen Emma. This work of your elder and the people with him brought him honor. When this house was made for Queen Emma, Queen Emma said to your grandfather, William Lindsey, 'In living with your wife, if she should give birth.....Name the child, Ka-hale-lau-māmane'.

According to Maly and Maly (2005:155), by asending Mauna Kea to bathe in Lake Waiau, the Queen sought to demonstrate her lineage and godly connections, and to perform a ceremonial cleansing in the most sacred of the waters of Kane. A *mele* composed following the trip refers to Mauna Kea as the *piko* (summit, symbolically, the cord which connects Hawai'i to the heavens; ibid.) of Wākea, and also references scenery, and a number of named places in the vicinity of the current study area including Ahumoa, the *palila,* and the *māmane* forests. A section of the *mele*, entitled *He Inoa Pii Mauna no Kaleleonalani* (In the Name of Kaleleonalani, Ascending the Mountain) composed by Kaniu Lumaheihei Kapela in 1882 and translated by Kepa Maly (in Maly and Maly 2005:156-157) is reproduced below:

He Inoa Pii Mauna no Kaleleonalani (Na Kaniu Lumaheihei o Kapela i haku)	**In the Name of Kaleleonalani, Ascending the Mountain (Composed by Kaniu Lumaheihei Kapela)**
Kaulana ke anu i Waikii	Famous is the cold of Waiki'i,
Oo i ka ili o ka Lani	Piercing the skin of the Chiefess.
E aha ana la Emalani	What is it that Emalani is doing?
E walea a nanea ae ana	Relaxing and enjoying,
I ka leo hone o ka Palila	The sweet voices of the *Palila,*
Oia manu noho Kuahiwi	Those birds that dwell upon the Mountain
Kikaha o ka Iwi-Polena	The *'I'iwi-polena* soars overhead,
Ko Hoa ia e like ai	It is like your companion.

Hoolulu Kapena Kaulani	Captain Kaulani called us to shelter,
Ina ae hoi kakou	If we should continue.
Kaalo ana Ahumoa mamua	We then passed before Ahumoa,
A kau i ke one heehee	Rising to the sliding cinders (Onehehe'e).
A imua, a i hope o ka Lani	The Chiefess moved forward and backwards.
He ihona loa ana Kilohana	Descending the length of Kilohana.
Noho ana o Pumauu i ka lai	Pu'u Mau'u sits in the clam,
Au mai ana o Puukapele	Pu'ukapele juts out,
Kaala i kuu maka ke aloha	My eyes rise up with love.
Komo i ka olu o Kalaieha	We entered the cool of Kalaieha,
Eia mai ke Kuini Emalani	Here is Queen Emalani
Ua wehe i ka pua mamane	The blossom of the *māmane* has opened.
E o ke Kuini Emalani	Respond Queen Emalani
Kaleleonalani he Inoa	Kaleleonalani is the name. [BPBM Archive, *Mele* Collection; call # fHI.M50; May, translator]

Until 1891, the entirety of the mountain lands in Ka'ohe was managed by the government as a single parcel. Beginning in that year with Lease No. 451 to the Humu'ula Sheep Station, Ka'ohe was divided into sections (e.g., Ka'ohe 1-5) and bid out as separate parcels. Ka'ohe 3 was leased to Samuel Parker on September 24, 1891. The boundaries of Ka'ohe Tract No. 3 are described in C.S.F. 423 as follows (the current study area is adjacent to Pu'u La'au in the northeastern corner of the leased area):

September 24, 1891
C.S.F. 423
Description of Tract No. 3 Kaohe, Hamakua, Hawaii.
Leased to His Ex. Samuel Parker.

Beginning at the South East corner of the land Kalopa, and running as follows:

1. N 79° 30' W true 3800 ft. along Kalopa to Summit of hill Moano;
2. N 80° 30' W true 6500 ft. along the same;
3. S 80° 00' W true 2500 ft. to the corner of Kalopa and Paauhau to a pile of stones, above Koailiili gulch;
4. S 88° 10' W true 5027 ft. along Paauhau to a pile of stones on the N W side of Kaluamakani;
5. S 43° 34' W true 16170 ft. along Paauhau to Kemole hill;
6. S 54° 10' W true 27900 ft. along Paauhau to Puu Laau;
7. N 70° 00' W true 9700 ft. along Paauhau to a point near Aiakala on Auwaiakekua;
8. S 35° 30' W true 8500 ft., along Waikoloa to Keonehehee;
9. S 20° 30' E true 22200 ft. along Waikoloa passing Puu Kekee, to the South corner of Waikoloa on the Southeast side of Puu Ka Pele;
10. N 68° 30' E true 60200 ft. along Lot 4 Kaohe, to the summit Peak of Maunakea, to the old Trig Station on the NE point of it.
11. N 17° 30' E true 22600 ft. along Lot 5 Kaohe, to the peak Kole;
12. N 9° 00' E true 8700 ft. along the same down the mountain side to the initial point and containing an area of 38700 Acres. [Hawaii State Survey Division]

This lease is granted upon the condition that the Government may at any time during the term of this lease, enter upon, take possession, and dispose of all, or any portion of the same for homestead purposes, the Government, allowing in such case, a corresponding reduction on the rents...

Consent is hereby given to a mortgage of the foregoing Lease to Charles A. Bishop trustee and to Mr. G. Irwin and S.M. Damon Trustees...Chas T. Gulick, Minister of the Interior. [Hawaii State Survey Division Files in Maly and Maly 2005:422]

While livestock ranching developed in Ka'ohe, concerns began to be raised about a noticeable retreat of the forests on Mauna Kea and Mauna Loa. The loss of forest acreage was attributed to unchecked grazing by feral sheep, goats, and cattle. Ranching leases during this period addressed these concerns by requiring fencing and disallowing the cutting of timber in the mountain lands (examples of these leases are reproduced in Maly and Maly 2005:384, 386). Feral animals continued to exacerbate the deforestation throughout the nineteenth century. In 1876, the government began to take legal measures to protect the forest when King Kalākaua enacted an "Act for the Protection and Preservation of the Woods" (Hawai'i Laws Chapter XXX:39). This law authorized the Minister of the Interior to set apart lands to prevent damage to government lands, particularly forest lands and water resources. This act was followed in 1893 by the establishment of the Bureau of Agriculture and Forestry through an act of the Legislature and approved by Queen Lili'uokalani. The Bureau was charged with preserving and rehabilitating forest lands as a means of fighting the effects of diminished rainfall that had been caused by deforestation (Maly and Maly 2005:521). An 1892 account of a Mauna Kea survey trip by W.D. Alexander in the Honolulu Commercial Advertiser noted that Waiki'i was excellent grazing country (i.e., mostly grass), but that a fine grove of *māmane* trees still survived at Auwaiakeakua Gulch, which runs just north of Pu'u La'au (Maly and Maly 2005:182). The value of the *māmane* forest for both commercial (e.g., fence posts) and watershed purposes was increasingly recognized in the later kingdom, Republic of Hawai'i and early Territorial days.

The Mauna Kea Forest Reserve

The Bureau of Agriculture and Forestry was absorbed into the Board of Commissioners of Agriculture and Forestry in 1900, after which it began to study the affected forest lands in Ka'ohe and elsewhere in the islands. The Board of Commissioners of Agriculture and Forestry recommended establishing a reserve in Ka'ohe in 1905 and 1906, which ultimately led to the establishment of the Mauna Kea Forest Reserve in 1909 (Maly and Maly 2005:521). The proposal for the reserve written by Superintendent of Forestry Ralph S. Hosmer proposed a line extending clockwise from Ahumoa to Pu'u La'au to the Pa'auhau boundary over to Kemole (Figure 14), on which a cattle and sheep-proof fence would be built. The manager of Parker Ranch, Alfred A. Carter, was in agreement (Maly and Maly 2005:433, 542). The creation of the reserve removed a total of 66,600 acres of summit and adjacent lands from private leases. A resolution in regard to the retention of the *mauka* part of the Land of Ka'ohe by the Government from sale or lease (as contained in a report dated Nov. 1st, 1906, and based on a report of the Superintendent of Forestry dated Oct. 13th, 1906) was adopted by the Board of Agriculture and Forestry on December 21, 1906. The resolution stated:

> . . . that the Board recommends to the Governor that the portion of Kaohe lying above a line roughly described as beginning on the boundary between Kaohe 4 and 5 at the end of the mauka fence required to be built across Kaohe 4 by a lease sold to Mr. A.M. Brown in December, 1904, and running in a general northwesterly direction, mauka of Puu Ahumoa to Puu Laau, thence northeasterly along the mauka boundary of Paauhau to Puu Kemole, thence mauka of Puu Kaluamakani to a point on the division line between Kaohe 3 and Kaohe 5, thence along said division line to the northwest end of the existing fence across Kaohe 5, built by the Kukaiau Plantation Company, thence in a general southeasterly direction across Kaohe 5, following said fence, to the Humuula boundary, thence following said Humuula boundary to the south and west around Mauna Kea to the southeast line of Kaohe 4, thence across Kaohe 4, following the above described fence to the point of beginning, and also the portion of the land of Kaohe that lies above the Keamuku and the 1843 lava flows on the north slope of Mauna Loa, be for the present reserved by the Government from sale or lease and retained by the Land Office as waste land. [HFA, 1907:429 in Maly and Maly 2005:541-542]

The report of the Superintendent of Forestry dated October 13, 1906, clarifies Parker Ranch's role in protecting the forest reserve, stating that"Mr. A.W. Carter, representing the Parker Ranch, has proposed to lease the grazing land in Kaohe 3, with a proviso in the lease that a fence be built and maintained across Kaohe 3 following the line just described . . . With the building of the fences on Kaohe 3 and 4 and the gradual capture of the wild cattle on the mountain, facilitated thereby, stock will be kept off this upper section" (in Maly and Maly 2005:543). For his part, Alfred W. Carter, on December 11, 1906 wrote a letter to James W. Pratt, Land Commissioner, stating that ". . . Upon re-leasing a portion of Kaohe III, I will undertake to construct one half of the fence, joining with the successful bidder of said land, from Puulaau to Kemole, along the boundary between the land of Paauhau and Kemole" (Parker Ranch-PPS, Humuula File in Maly and Maly 2005). The government was to build the other half of the fence.

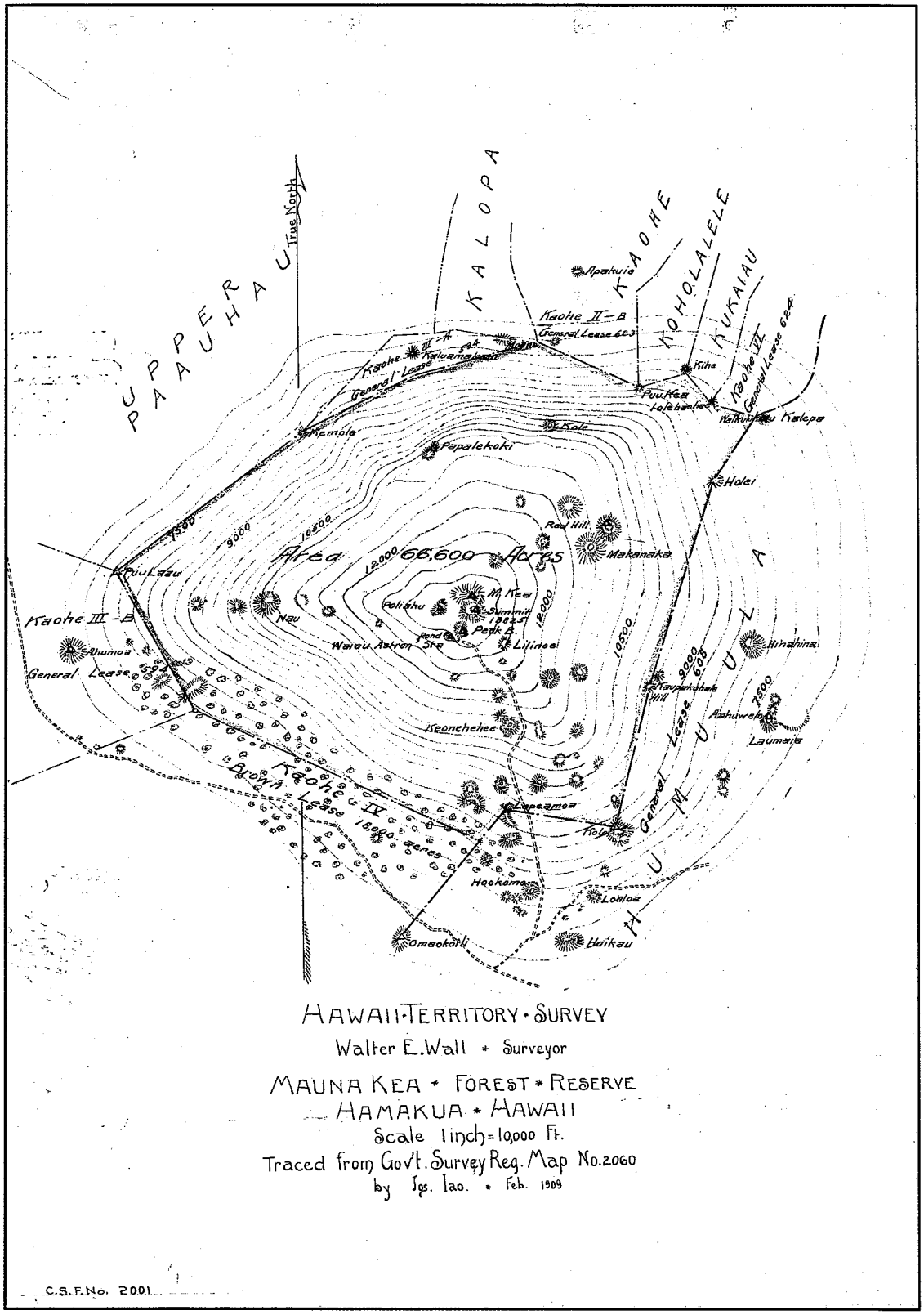


Figure 14. 1909 map (C.S.F. 2001) of the Mauna Kea Forest Reserve (note Pu'u La'au marking the western corner).

In 1913, R. S. Hosmer presented a special report to the Board of Commissioners of Agriculture and Forestry that discussed the fencing of the Mauna Kea Forest Reserve and its progress. The November 18, 1913 letter, which specifically metions the Parker Ranch General Lease No. 594 for Ka'ohe 3 and Pu'u La'au, states:

> In passing mention may be made here of the Mauna Kea Forest Reserve that takes in all the upper slopes of that mountain above approximately the 8000 foot contour, altho' across Humuula it is somewhat higher - about 9,500 feet. For the greater part of the way around the mountain the line is substantially fenced; above Humuula by a fence built about 20 years ago by Mr. Haneberg and now kept in repair, under the terms of its lease, by the Humuula Sheep Station Company; above the Kukaiau ranch by paddock fences, which with other fences on that ranch are now being, or soon will be repaired and put in good shape; above the Parker Ranch, by strong fences built and now maintained by a regular fence rider. These fences are all required to be maintained under Government Leases, respectively Nos. 608, 623, 624, 594. Under Lease 594 it was provided that the Government pay half of the cost of the fence on the boundary between the forest reserve and the fee simple land of Upper Paauhau (Parker Ranch), from Puu Laau to Puu Kemole. Lease 608 runs 'til 1930, the others to 1928.
>
> The section on the west slope of the Mountain, between Waikii and the boundary of Humuula, across the Government land known as Kaohe 4, is not fenced. This section is not under lease. It was lately the scene of certain litigation over a broken lease, between Mr. A.M. Brown and the Government.
>
> There are still some wild cattle on Mauna Kea, and a few herds of wild horses, but thru' driving and shooting by men from the neighboring ranches the numbers of these animals have been very much reduced. There are also wild pigs on Mauna Kea, but not, I think, in very great numbers... [HSA - Gov 2–1 Board of Forestry & Agriculture in Maly and Maly 2005:553]

On March 14, 1929 the pasture lease for 12,131 acres of Ka'ohe 3 (Section B), including the current study area was renewed by Parker Ranch (C.S.F 5301; Figure 15). The boundary was described as adjoining the Mauna Kea Forest Reserve, and the lands of Paauhau and Waikoloa, and "beginning at a + on the Northeast slope of Puu Laau on set stone at the Northeast corner of this tract, on the Southwest boundary of the *Mauna Kea* Forest Reserve" (Maly and Maly 2005:442). Carter, who won the lease for Ka'ohe 3, noted on April 29, 1929 that he was run up on all the Ka'ohe leases, and that on this "section of Kaohe between the Waikii gate and the last gate [referred to as the Ahumoa section] consisting of about 11,000 or 12,000 acres, I was run up to $4,000.00, which is an excessive rental but considering the fact that it butts right into our Waikii paddock, it was essential that we get it" (Maly and Maly 2005:443).

Conservation in the Mauna Kea Forest Reserve received a major boost in funding and manpower during the 1930s when the Civilian Conservation Corps (CCC), one of several New Deal programs begun in 1933, was established in the Territory. While the first 57 CCC enrollees on Hawai'i Island began working in 1934 (Bryan 1938), it was not until June of 1935 the first CCC camp was established (in Hawai'i National Park), which housed 200 enrollees (Roper 2008). Additional camps were also constructed around Mauna Kea Forest Reserve boundaries to house crews of CCC enrollees, including one to the east of the current study area that is referred to as the Pu'u La'au cabin (built in ca. 1935; McIntosh and Milstein 1964). One of the major accomplishments of the CCC on Mauna Kea was the construction of a sheep-proof fence around the entire perimeter of forest reserve at roughly the 8,000-foot contour (Figure 16). Upon completion of the fence the CCC killed or captured almost 16,000 wild animals to remove them from the reserve. The 55.5-mile long, 55-inch high, extra heavy galvanized stock wire fence was completed in January of 1937 at a cost of $72,000, or $1,300 per mile, and utilized *māmane* posts (Maly and Maly 2005:239-41). Later in 1937, additional portions of Humu'ula, Ka'ohe, and some privately held lands were added to the Mauna Kea Forest Reserve, increasing its area to 88,108 acres. The additions to the forest reserve were also fenced, and the feral sheep were removed by the CCC that year (Maly and Maly 2005:241). The onset of World War II brought an end to the CCC program, as the remaining manpower and funding for the program were redirected toward the war effort. By July 1, 1942, all Territory of Hawai'i camps were closed, transferred to the military, or abandoned (Urban and Solamillo 2011:48).

Rally Greenwell, who worked as a *paniolo* at Parker Ranch, and who eventually became Ranch Manager, recounted to Kepā Maly in a 2000 interview that Bill Bryan planted the conifers that now grace the Pu'u La'au area adjacent to the CCC cabin (Maly and Maly 2005:A-68). He indicated that the cowboys did not generally travel beyond the fence line and that Parker Ranch helped Mr. Bryan maintain the fence. Other cowboys, including Jiro Yamaguchi in his interviews with Maly, said that some cowboys would occasionally *holoholo* up the west side of Mauna Kea from Pu'u La'au, although not to the summit (Maly and Maly 2005:A-78).

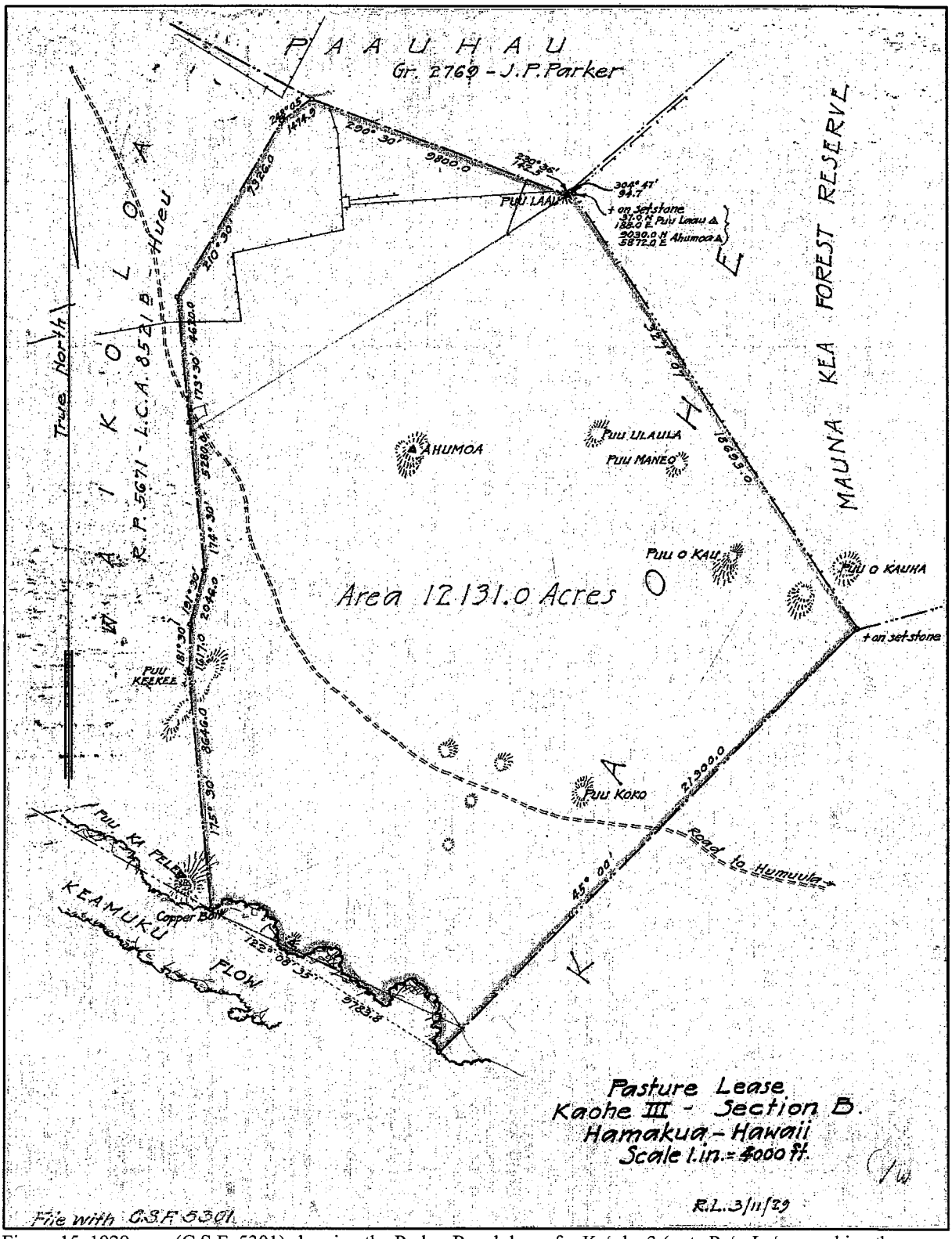


Figure 15. 1929 map (C.S.F. 5301) showing the Parker Ranch lease for Ka'ohe 3 (note Pu'u La'au marking the northeast corner boundary).



Figure 16. The CCC building the Mauna Kea Forest Reserve Fence in ca. 1935 (photograph reproduced from the Hawai'i State Archives digital collection).

The current study area remained ranch land throughout much of the twentieth century, and eventually became part of the State-administered Ka'ohe Game Management Area, where hunting and bird watching are currently popular activities. In 2002, as a result of the loss of critical *palila* habitat due to the Saddle Road realignment, the State Department of Land and Natural Resources and the U.S. Fish and Wildlife Service agreed to set aside two areas for *palila* habitat restoration (see Figure 3). These areas included the Pu'u Mali Restoration Area (5,140 acres) on the northern slope of Mauna Kea and the Ka'ohe Restoration Area (1,400 acres) on the southwestern slope, where the current study area is located. The Mauna Kea Forest Restoration Project (MKFRP) was initiated in 2006 when funding was obtained to support staff and management efforts. The goal of the project is to facilitate management that benefits *palila* at Pu'u Mali and Ka'ohe Restoration Areas and on other lands in *palila* critical habitat. The proposed Palila Forest Discovery Trail is one aspect of this restoration project.

PREVIOUS ARCHAEOLOGICAL STUDIES

Previous archaeological studies of the inland portions of the Hāmākua District are limited primarily to the Pohakuloa Training Area, within the saddle region between Mauna Kea and Mauna Loa, located well to the south of the current study area, and to the Mauna Kea adze quarry, located near the summit of the mountain, well to the east of the current study area. Slightly nearer, Langlas et al. (1999) conducted an archaeological inventory survey and historic and traditional cultural assessment for the development of the Hawai'i Defense Access Road A-AD-6(1) and Saddle Road (SR 200) Project. That survey investigated both the older Saddle Road alignment, which had been previously investigated by Welch (1993), and what is now the current alignment of the Daniel K. Inouye Highway, but no archaeological sites were identified in the vicinity of the current study area. To the northwest of the study area, Bulgrin and Rechtman (2005) conducted an archaeological assessment survey of the Waiki'i Ranch Increment II development area in Waikoloa Ahupua'a within the District of South Kohala (TMK: (3) 6-7-001:022), but also did not identify any archaeological resources.

Most proximate to the current study, SHPD archaeologist Sean Nāleimaile conducted a site visit at two locations within the Ka'ohe Game Management Area for the installation of fire diptanks (including the location of the diptank recently installed at the proposed parking area of the Palila Forest Discovery Trail; see Figure 6). The purpose of the January 29, 2013 visit was to determine the presence or absence of historic properties within these two areas. No historic properties were identified within the diptank locations, but during the site visit the presence of the Pu'u La'au Ranger Cabin was noted in close proximity to the construction area for the upper diptank. To remedy this situation, in consultation with Sean Nāleimaile, an alternative site was chosen. The new site (at the location of the currently proposed parking area), was chosen to minimize impacts in any way (particularly visual) to the area around the cabin. The alternative site is located in the vicinity of the cabin, but the view of the diptank from the cabin is blocked by a hill. The SHPD letter (Log No. 2013.1787, Doc No. 1302SN02) included with the Environmental Assessment for the Ka'ohe Fire Diptanks (Geometrician 2013) indicates that both of the selected locations had been previously impacted by mechanical equipment prior to their recent installation.

3. STUDY AREA EXPECTATIONS

In *A Regional Synthesis of the Hāmākua District, Island of Hawai'i*, Dr. Ross Cordy (1994) summarized the general Prehistoric and early Historic land use patterns for the entire district of Hāmākua. The summary is based on a review of *Māhele* records combined with a detailed examination of archival historical information and archaeological site records. According to Cordy's (1994:85-87) settlement model, the current study area falls within what he terms "The Upper Slopes of the Mauna Kea Subregion," and more specifically within "The Māmane Lands" of that subregion. Cordy notes that resources such as *pili* grass for thatching, *māmane* for adze handles, and birds such as *nēnē* and *'u'au* may have been gathered from this region during the Precontact and early Historic Periods. The exploitation of these resources suggests that short term camps, shelter caves, and overhangs would have been utilized by Hawaiians visiting the area, and that water sources would have been important, commonly accessed locations. Cordy indicates however that only two kinds of sites are clearly documented in the archival accounts of The Māmane Zone: trails and burials. One major trail is known to have skirted the base of Mauna Loa on the inland side, very roughly approximating the route of Saddle Road, connecting Hilo with Waimea, and passing to the west of the current study area. Clusters of short term camps, as well as markers, rest areas, and water sources would be expected adjacent to the route of this trail. Branch trails may have extended off of the main trail to access various resource areas, but as McEldowney (1982) notes these trails were likely not well marked, as landmarks (prominent visual markers) appear to have been the focal point of travel across the Upper Slopes region.

Concerning the second site type, burials, Cordy notes that in Ka'ohe and Kūka'iau several cinder cones near the 7,500-foot elevation on Mauna Kea are historically reported as burial locations. Pu'u La'au is not mentioned as a place of burial, but the hill clearly served as a visual landscape marker, as it currently marks the boundary between Pā'auhau and Ka'ohe *ahupua'a*. Historical survey documents mention various marks etched in stone near the top of *pu'u*, but it is likely that modern quarrying activity, which has severely modified the summit and eastern slope of Pu'u La'au, has destroyed any such former markers. During the latter Historic Period land use within The Upper Slopes of the Mauna Kea Subregion shifted to cattle ranching. It is possible that Historic sites related to Parker Ranch's use of the land for more than a century during the late nineteenth and twentieth centuries may be discovered within the study area. One known Historic site, the Pu'u Lu'au Ranger Cabin, constructed by the Civilian conservation Corps (CCC) in ca. 1935 is situated within the Mauna Kea Forest Reserve just to the east of the current study area. The Palila Forest Discovery Trail has been designed to keep hikers away from the cabin and minimize visual impacts to the Historic resource, but it is possible that other CCC related sites associated with the cabin may be present within the study area.

In summary, given the background research conducted for this study and the settlement model provided by Cordy (1994), the overall expectation to encounter significant historic properties within the current study area is low. Precontact and early Historic activities within the study area were limited and unlikely to leave archaeological traces. While Pu'u La'au continues to serve as a visual landscape marker, and the use of the study area for ranching and housing CCC work crews during the twentieth century has left tangible traces on the landscape, modern ranching, quarrying, conservation and fire suppression activities within the proposed trail area have disturbed or destroyed most evidence of those past activities. It is possible that remains or rubbish associated CCC-era camp building near Pu'u La'au may be encountered in the eastern portion of the study area.

4. CURRENT FIELD INVESTIGATION

Fieldwork consisted of a pedestrian survey of the Proposed Palila Forest Discovery trail route, the adjacent, grassy forest restoration areas, and the previously graded parking area and composting toilet locations (Figure 17). The archaeological survey was conducted on January 12, 2016 under the direction of Robert B. Rechtman, Ph.D., by ASM Senior Archaeologist, Matthew R. Clark, B.A., accompanied in the field by Jackson Bauer, volunteer coordinator for the Mauna Kea Forest Restoration Project, who pointed out the proposed trail route and related infrastructure, and Ron Terry, Ph.D. of Geometrician Associates, LLC, who is preparing the Environmental Assessment for the trail. During the fieldwork the surface of the entire study area, was examined for extant archaeological remains, but none were encountered.

On the adjoining parcel (TMK: (3) 4-4-015:001) to the east of the study area the location of the Pu'u La'au Ranger Cabin, built by the CCC during the mid-1930s, was noted and inspected (see Figure 17). The two room, post and pier structure (Figure 18) includes an adjacent wooden water tank and a nearby outhouse structure (Figure 19). In front of the cabin is a memorial plaque affixed to a boulder that reads, "In memory of a great sportsman of Hawai'i, Bernard 'Buck' Thom, Hawaiian Fish & Game Ass'n, 1967" (Figure 20). In an effort to maintain the integrity of the Historic setting, the proposed Clivus-style toilet will be placed adjacent to a stand of large trees that will block the view plane from the cabin, and the proposed trail route will direct hikers off of the existing 4WD road, away from the cabin, back to the parking area. Placement of the composting toilet in relatively close proximity to the cabin will also help deter trail goers from using the existing facilities at this Historic structure.



Figure 17. Aerial view of the study area showing the extent of the archaeological survey, Pu'u La'au, and the location of the Pu'u La'au Ranger Cabin.



Figure 18. Pu'u La'au Ranger Cabin and water tank, view to the northwest.



Figure 19. Existing outhouse to the east of the cabin, view to the north.



Figure 20. Memorial plaque for Bernard "Buck" Thom on a boulder in front of the cabin, view to the northeast.

5. CONCLUSION AND RECOMMENDATIONS

As a result of the current Archaeological Assessment survey there were no archaeological resources identified within the current study area, and no negative impacts to the Pu'u La'au Ranger Cabin, situated to the east of the study area within the Mauna Kea Forest Reserve, are anticipated from the proposed trail development. The placement of a Clivus-style toilet in the general vicinity of the cabin may actually have positive impacts on the Historic structure, as visitors to the area will be less likely access the cabin for water or to use the existing outhouse. Given these findings, it is our conclusion that the proposed Palila Forest Discovery Trail will not affect any historic properties. With respect to the historic preservation review process of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawai'i Planning Department, our recommendation is that no further work needs to be conducted prior to or during project implementation. In the unlikely event that significant archaeological resources are discovered during the implementation of the trail project, work should cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

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