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Laupahoehoe Research and Education Center Construction Project EA
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Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project



Pacific Southwest Research Station – Institute of Pacific Islands
Forestry



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Summary

The Institute of Pacific Islands Forestry, Pacific Southwest Research Station (IPIF), United States Department of Agriculture, Forest Service proposes to construct a state-of-the-art, environmentally sensitive research and education facility that will support the vision and objectives of the newly established Laupahoehoe Unit of the Hawaii Experimental Tropical Forest (HETF). The project would construct facilities to house sleeping quarters for up to 20 persons, for storage areas, and for one permanent residence for a full-time caretaker. Construction would include road repair and minor re-alignment along the Manowaiopae Homestead Road. Four alternatives developed during public scoping and the no-action alternatives are evaluated within this environmental assessment (EA).

As a result of this assessment, the preferred alternative (Alternative 5) would include power to the facilities site from existing service via overhead lines, and buried electrical service in specific areas to mitigate visual impacts to visitors and nearby landowners. Solar panels would also be installed to provide supplemental power. Implementation of mitigation measures would result in little to no impacts to wildlife or State listed species and no adverse effects to federally listed species that are known or may occur in and near the project area. No cultural or historical properties were identified within the project area, thus no impacts are expected. Additionally, this project would be in compliance with all county building regulations and would implement mitigation measures and best management practices related to soils and water to further reduce any potential environmental impacts. It is expected that implementation of the environmentally preferred Alternative 5 would not have a significant negative impact on the environment, and a finding of no significant impact (FONSI) is anticipated.

Section 1. Purpose and Need

Background

In 1992, the Hawaii Tropical Forest Recovery Act authorized the establishment of Hawaii Experimental Tropical Forest (HETF) to serve as a center for long-term research and a focal point for developing and transferring knowledge and expertise for the management of tropical forests. Objectives for the HETF are to: (1) provide lands for conducting research that serves as bases for the restoration, conservation, and management of forests in Hawaii and across tropical areas served by the Pacific Southwest Research Station; (2) provide education facilities for the general public and University and Forest Service staffs; and (3) serve as a site providing local, regional, and global long-term environmental monitoring data.

The vision of the HETF is a research, demonstration, and educational forest focusing on ecological, economical, and cultural values important to all people of Hawaii. The experimental forest will not only provide research opportunities for scientists, but will also provide learning opportunities for school children who will be the future generations of landowners, land managers, and scientists.

The HETF on the Island of Hawaii is divided into two units: the Laupahoehoe Wet Forest Unit and the Pu'u Wa'awa'a Dry Forest Unit. The research and education center facility construction near the Laupahoehoe Wet Forest Unit outlined in this document supports the vision and helps meet objectives of the HETF. The Institute of Pacific Islands Forestry (IPIF) of the Pacific Southwest Research Station works together with the State of Hawaii in the management of the experimental forest.

Purpose and Need for Action

The Laupahoehoe Research and Education Center is needed so the HETF can meet its full potential for research, education, and demonstration. The purpose of the new center is to provide facilities that will support HETF research, demonstration, and educational functions serving the entire Pacific Basin. Facilities that meet these purposes are not currently available at the Laupahoehoe site.

Project Description, Location, and Property Ownership

The area of these proposed facilities is located in Hawaii County, 3.7 miles south-southwest of the town of Laupahoehoe ([Figure 1. Project Location Map](#)). Construction of these facilities for the center would include infrastructure development providing housing for approximately 20 people, a caretakers residence, administrative and teaching areas, utility and storage areas, fencing, and a parking area. Design of the facilities will follow the latest energy codes. Power generation for the facilities may include solar, wind, propane generators and extension use from existing overhead powerlines. Limited road improvements, such as grading and resurfacing, and minor road realignment at the Kapili Stream crossing (for safer passage during high water and to circumvent an undercut) would occur along Manowaiopae Homestead Road.

The facilities would be located on state-owned land under the A-20 zoned district. A 20-acre parcel lease has been established between the State of Hawaii and the USDA-Forest Service for the construction of these facilities ([Figure 2. Project Location Topographic Map](#)). Road accessing the proposed facility area traverses through state and private property ([Figure 2. Project Location Topographic Map](#) and [Figure 3. Project Location TMK Map](#)). A cadastral survey of the road corridor and the 1 to 3-acre area (footprint) located within the 20-acre leased area shows elevation gradients and identifies all native and nonnative trees ([Figure 4. Project Location Survey Map](#)). Site photographs ([Figure 5. Site Photos of Facility Footprint Location and Drainage Structure, Low Water Crossing](#)) show the general 1 to 3-acre footprint area where the research and educational center would be located and the road improvements ([Figure 6. Site Photos of Road Re-alignment Area](#)).

Environmental Assessment Process

This environmental assessment (EA) process is being conducted in accordance with the National Environmental Policy Act (NEPA) and Chapter 343 of the Hawaii Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawaii Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawaii. 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.

Decision Framework

The decision to be made is whether or not to complete the project and how to supply energy (green and other) to the research and education center.

Public Involvement and Agency Coordination

On August 19, 2008, IPIF mailed a public scoping letter to the people, governmental organizations, and others listed in Appendix A. A public meeting to further inform the community and solicit additional public input on the proposed action was held September 10, 2008, at the Laupahoehoe High School. Outreach for the meeting included public service announcements on the local radio station, flyers placed around the community of Laupahoehoe, and a meeting notice published in the

Hawaii Tribune-Herald. Proposed action and contact information was posted to the HETF internet site: http://www.hetf.us/page/projects_plans/ on August 20, 2008. Twenty-five responses (in writing, telephone calls, or verbal) were brought forward from public involvement. See Appendix B for actual letters and comments from the public meeting.

Issues

During the process of internal scoping and public involvement, issues associated with the proposed action were brought forward. An issue is a point of disagreement, debate, or dispute with a proposed action based on some anticipated effect. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." Significant issues are those with a clear direct or indirect causal relationship from implementing the proposed action. Non-significant issues are identified as those (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence.

Significant Issues

Significant issues brought up during internal and external scoping include:

Issue: *Overhead power lines impact the view plane of private land owners in the vicinity*

The public voiced issues related to the scenic impact from installation of above ground power lines.

Indicator: *Area along proposed power line where above ground installation of power line would impact view plane.*

Issue: *Use of wind generation and fencing in the area may impact federally listed species known to occur in the area*

Impacts from wind turbines for supplemental electrical power and type of fencing around the compound was identified as having a potential to impact federally listed species that are known to occur near the proposed research and education center site. ***Indicator:*** *Impacts to federally listed species associated with proposed activities will be analyzed within the EA.*

Issue: *Costs associated with power generation including electrical (buried and above ground) and propane service to proposed research and education center*

Costs associated with power supply including electrical (buried and above ground) and propane service to the center. ***Indicator:*** *Costs of power sources for research and education center.*

Non-significant Issues

The following non-significant issues were not carried forward in the analysis:

Road maintenance and usage change from current status

It is expected that road usage will increase slightly from present use. All existing gates will remain in place and locked and will not be open to the general public. Anticipated uses from research activities would be linked with the type and scope of work being conducted and would likely vary over time. It is anticipated that research scientists and others accessing and using the research and education center would use roads with a frequency of approximately one to two vehicles per day.

Educational field trips hosted by IPIF staff would involve one or two high clearance vans transporting visitors to the site anticipated to be once per week and occasionally on weekends.

Power to research and education center by solar and wind only

The public requested that the research and education center be supported solely by solar and wind energy. Based on the power required to run the type of equipment necessary to support the number of visitors and activities (computers, monitors, research equipment, etc.), in combination with the site-specific limitations for production of energy from solar and wind energy, this is not financially feasible and outside the scope of the proposed action (Swienton 2009). Although solar and wind cannot provide all the power necessary to support the center, Alternatives 2–5 propose solar and wind to supplement energy needs onsite.

Will there be fencing and will it impact hunting?

The public was concerned that fencing the 20-acre parcel would impact hunting. The proposed action only proposes fencing around the 1 to 3-acre footprint of the research and education center for security and protection from cattle and feral pigs. Additionally, the 20-acre parcel is not considered to be a high hunting use area since it is currently a cow pasture; hence, there would be no significant impact on recreational hunting.

Will there be jobs generated for the local community?

Construction of the research and education center may provide jobs on a short-term basis; however, creation of jobs for the local community is outside the purpose and need of the project and therefore outside the scope of analysis.

Issues Already Considered in the Development of This Proposal

Additional issues brought forth by the public and considered in the development of the proposal included control and treatment of invasive species associated with construction activities, nighttime lighting impacting private landowners, emergency care for visitors and caretaker at the center, and power supplied to facility by solar and wind only.

Invasive Species: Facility design would include the installation of a permanent wash station for vehicles and personnel conducting research in the HETF to reduce the potential for invasive species spread. Additionally, native species would be planted in and around the area disturbed by construction as a design feature associated with facility design. Treatment of invasive species on state lands along the access road to the facility is done by the lessee (Imoto, 2009). Other private landowners such as Kamehameha Schools also treat invasive species along the access roads (Whitehead 2008).

Nighttime Lighting: Installation of any lighting would comply with county building codes. No installation of lighting along Manowaiopae Homestead Road is proposed. Nighttime lighting expected to be installed at the research and education center would not be viewable to private landowners nearby due to location and vegetation.

Emergency Care: Installation of facilities will comply with all county building requirements related to safety. Additionally, facility design would include a parking lot that could function as a helipad in the event of emergency.

Facility Power by Solar and Wind Only: Preliminary analysis conducted by the design team determined adequate power could not be provided by these sources alone or in combination (Swienton 2009).

Section 2. Alternatives

The following paragraphs describe all alternatives for the HETF Research and Educational Center construction project including the no action alternative.

Alternative 1 (No Action)

Under the no action alternative, no ground disturbing activities, facility construction or minor road improvements would occur. Research activities associated with the HETF would continue to occur requiring research scientists to travel to HETF on a more frequent basis from Hilo or other places of residence to conduct research. Educational program scope would be reduced due to the absence of teaching rooms and facilities. Grazing activity would continue on the site.

Alternative 2 (Proposed Action Power for Facilities from Buried Electrical Power Line and Green Energy)

Alternative 2 addresses the issue of overhead power line impacts to the view plane of private land owners in the vicinity, fencing impacts to federally listed species, and includes the following activities for facility construction:

- Two to three housing units (20 person sleeping quarter capacity) with centralized facilities, one caretaker's living unit, one administrative unit with teaching and meeting rooms, utility storage buildings, rooftop water collection systems, permanent vehicle wash stations and a parking area (20 vehicle capacity). The parking area may serve as a helipad site, or may be constructed within the facility footprint depending on site design. Infrastructure development associated with construction would include trenching at specific locations within the facility footprint for electrical, propane for cooking, and septic systems. Depths of trenching will comply with all State and county regulations. Footprint of these facilities is approximately 1 to 3.0 acres.
- Fencing for security and cattle/feral ungulate exclusion would be installed around the 1 to 3-acre facility site. The top wire of the fence would be smooth to reduce any chances of injury to birds or bats. To ensure exclusion of wild ungulates some barbed wire fence may be used and fencing mesh size may be more tightly woven closer to the ground and buried to exclude nonnative predators.
- All efforts in facility design would preserve existing native Ohia (*Metrosideros polymorpha*) and Papala Kepau (*Pisonia umbellifera*) trees. No more than 5 percent of native trees within the footprint area are expected to be removed for facility construction and safety. Re-vegetation with native plants would occur in areas disturbed by construction activities within the facility footprint. Small native plant demonstration gardens for educational purposes may also be constructed and located within the facility complex footprint.
- Power for the center would be supplied by extension of electrical lines from existing service adjacent to Manowaiopae Homestead Road. Portions of electrical service would be buried

- between the low water crossing to the sharp turn up the slope (approximately 1,751 feet or 0.33 mile) to mitigate visual impacts ([Figure 7. Electrical Line Burial Location Map](#)).
- Although wind and solar energy sources alone cannot supply power necessary for the proposed center, installation of solar panels and wind generators would provide supplemental green energy for these facilities. One wind generator with a maximum height of 120 feet would be located near the center in an area that maximizes wind-power generation and is at least 100 feet away from existing trees. Solar panels as supplemental power would be located either on rooftops of facilities or on free-standing posts nearby. Installations of alternative energy sources would comply with all county building and zoning codes (<http://www.co.hawaii.hi.us/countycode/chapter25.pdf>).
 - Limited road improvements, such as grading to smooth out rough areas and resurfacing in some areas, would occur along Manowaiopae Homestead Road. No road widening beyond the existing road template or major resurfacing would occur except for the road repair at the Kapili Stream crossing. Minor road realignment at the Kapili Stream crossing would provide safer passage during high water and eliminate safety concerns related to the existing road undercut. An approximate 12-foot shift of the roadway from the center of the Kapili stream road crossing and for the next 25 feet (traveling up the road) would improve the horizontal curve and also avoid the undercut. The elevation of the road may change slightly, but will match the stream on the high side and maintain the same flow capacity. The existing crossing will remain intact where it is not undercut; however, traffic will be diverted away from existing road undercut. Water depth indicators will be placed on each side of the stream crossing to alert vehicle drivers of water depth in the event of a large storm.

Alternative 3 (Power for Facilities from Overhead Electrical Powerline and Green Energy)

This alternative is the same as Alternative 2, except power to the facilities would be completely above ground. The power line would run parallel to the Manowaiopae Homestead Road with power pole placement within the road right-of-way. Alternative 3 evaluates the costs associated with installation of above ground power.

Alternative 4 (Power for Facilities from Propane Generation and Green Energy)

Alternative 4 is the same as Alternative 2, except main power for the facilities would be generated by an onsite propane generation system. No extension of power lines from existing service would occur. Some above ground electrical lines within the facility footprint (1 to 3-acre site) may occur at specific areas to provide service. Alternative 4 evaluates costs of power generation for the facility and the impacts to scenic view planes.

Alternative 5 (Power for Facilities from Buried Electrical Power Line and Green Energy from Solar Only)

This alternative is the same as Alternative 2, except a wind turbine would not be installed. Direct effects to wildlife in the form of mortality from operation of wind turbines are well documented (Kunz et al 2007; Johnson et al 2004; USFWS 2003; Arnett et al 2008) and can occur to birds and bats being killed directly by collisions with wind turbine rotors or towers. Alternative 5 addresses impacts to the federally listed species.

Mitigations Specific to Alternatives 2–5

Mitigation measures listed in Table 1 apply to all action alternatives (Alternatives 2–5). These mitigations would be implemented to reduce possible negative effects from activities proposed.

Table 1. Mitigation Measures for Laupahoehoe Research and Education Center Facility Construction Project

Mitigation Measure	Target Species/Habitat/Issue
Wildlife	
To reduce potential disturbance to roosting bats, no tree removal will occur when lactating or non-volant bats are present (April 15–September 1).	<i>Hawaiian hoary bat</i> <i>Lasiurus cinereus semotus</i>
To reduce potential impacts to bats, wind generators will not be operated during periods of bat activity (½ hour before sunset to ½ hour after sunrise) ¹ .	
To reduce potential impacts to foraging bats, only smooth wire will be used on the top of any fences constructed.	
To reduce potential impacts to foraging bats and seabirds, no lights would be installed on wind generator towers ¹ .	<i>Hawaiian hoary bat and seabirds</i>
To reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, the tower installed for the wind generator will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape ¹ .	<i>Hawaiian hoary bat and resident and migratory birds</i>
A nest survey of the site will be conducted prior to implementation. No activities would be permitted within 1,320 feet of an active Hawaiian hawk nest between April 1–August 15.	<i>Hawaiian hawk, (‘Io)</i> <i>Buteo solitarius</i>
Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) designed to make all structures “avian safe”.	<i>Hawaiian hawk and resident and migratory birds</i>
To ensure that nesting Hawaiian ducks are not disturbed, any sites proposed for road re-alignment work or culvert replacement will be surveyed to ensure that active nests are not disturbed.	<i>Hawaiian duck (Koloa Maoli)</i> <i>Anas wyvilliana</i>
In order to ensure that project design features are effective at reducing impacts, visual monitoring will be conducted along all fence lines and within 100 feet of any wind tower for a period of 3 years. If injury or mortality to any threatened or endangered species is documented, the USFWS will be contacted and appropriate mitigation measures implemented.	<i>Threatened and endangered wildlife</i>
Native Vegetation	
Removal of native tree species will be minimized to 95% unaffected within the footprint facility construction area and disturbed areas will be restored with native plant species.	<i>Protection of native plants and wildlife</i>
Invasive Species	
Prior to ground-disturbing activities at facility site, all contractor equipment will arrive at the work site clean and free of invasive species including plants and animals	<i>Protection of native plants and animals and their habitats</i>
Building materials including sand, gravel, rock and/or mulch for use at the facility site, it will be inspected and certified as invasive species free.	<i>Protection of native plants and habitats</i>
Permanent invasive species wash station drainage will be controlled and treated appropriately.	<i>Protection of native plants and animals and their habitats</i>

Mitigation Measure	Target Species/Habitat/Issue
Routine treatment of invasive species within Forest Reserve and Natural Area Reserves will be done by State of Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife. . All policies and procedures can be found at: http://www.hawaiiinvasivespecies.org/iscs/biisc/	<i>Protection of native flora and fauna</i>
Native plants used for re-vegetation will be treated for coqui frogs or acquired from a coqui frog-free nursery or supplier.	<i>Protection of native flora and fauna</i>
Hydrology	
Prior to implementation, a Section 404 Permit must be obtained from the U.S. Army Corps of Engineers.	<i>Compliance with the Clean Water Act section 404</i>
Prior to implementation, a National Pollutant Discharge Elimination System (NPDES) Individual Permit must be obtained	<i>Compliance with Hawaii Administrative Rules Chapters 11-55.</i>
It is recommended that the construction not take place when heavy rains and streamflow is likely to occur. The work would not take place when the stream is flowing.	<i>Reduce risk of sedimentation in Kapili Stream to protect water quality downstream and provide worker safety</i>
Heritage and Cultural	
The Hawaii State Historic Preservation Statute (Chapter 6E), affords protection to historic sites, including traditional cultural properties of ongoing cultural significance. The criteria, standards, and guidelines currently utilized by the DLNR-SHPD for the evaluation and documentation of cultural sites shall be complied with. The Hawaii Island Representative of DLNR-SHPD will be notified of any findings, when made.	<i>Cultural and historic resources</i>
If any burial remains are be discovered, they will be treated on a case-by-case basis in concurrence with Chapter 6E-43 (as amended by Act 306). Final disposition of remains will be determined in consultation with DLNR-SHPD, and Native Hawaiian descendants of the families associated with Laupahoehoe and adjoining lands.	<i>Burials</i>
Should evidence of any archaeological or culturally significant sites be encountered during construction, vegetation clearing, or fence construction work in the immediate vicinity of the findings will be terminated, and the Hawaii Island representative of DLNR-SHPD will be notified.	<i>Unanticipated discoveries</i>
Noise	
Whenever construction noise is expected to exceed the Department of Health’s (DOH) “maximum permissible” property-line noise levels, contractors will be required to consult with DOH per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction.	<i>Reduce noise impacts</i>
¹ Not applicable to Alternative 5.	

Alternatives Considered but Dropped from Further Analysis

Wind and solar power generation as a sole source of power for facilities was considered, but dropped from further analysis due to costs associated with purchase and upkeep of equipment (Swinton 2009).

Comparison of Alternatives

Table 2 lists only the resources identified within this EA that were considered to have impacts associated with any of the alternatives proposed. Resources not identified in this table were analyzed and no impacts were found related to any alternative.

Table 2. Comparison of Alternatives

Resource	Alternative 2 Power for Facilities from Buried Electrical Power Line and Green Energy	Alternative 3 Power for Facilities from Overhead Electrical Power Line and Green Energy	Alternative 4 Power for Facilities from Propane Generation and Green Energy	Alternative 5 Power for Facilities from Buried Electrical Power Line and Green Energy from Solar Only
Scenery	<ul style="list-style-type: none"> ■No effect to the visual environment along the road, or any effect in the scenic view from the properties up from the road with views to the ocean. ■Some adverse, minor and moderate long-term changes where above ground power lines would be installed. ■No effect to visual environment within the eucalyptus plantation. ■Moderate, adverse, long-term effect from installation of wind generator. 	<ul style="list-style-type: none"> ■Long-term, major adverse effect to the scenic view from the property paralleling the road with views north/northeast to the ocean. ■Some adverse, minor and moderate long-term changes where above ground power lines would be installed. ■No effect to visual environment within the eucalyptus plantation. ■Moderate, adverse long-term effect from installation of wind generator. 	<ul style="list-style-type: none"> ■No impact to scenery from the installation of electrical lines and poles along the road or at the site. 	<ul style="list-style-type: none"> ■Same as Alternative 2, except no impacts observed from installation of wind generator.
Wildlife	<ul style="list-style-type: none"> ■Likely to Adversely Affect two federally listed species: Newell's shearwater (<i>Puffinus auricularis</i>) (T) and Hawaiian petrel (<i>Pterodroma phaeopygia sandwichensis</i>) (E) from installation of wind generator. 	<ul style="list-style-type: none"> ■Likely to Adversely Affect two federally listed species: Newell's shearwater (<i>Puffinus auricularis</i>) (T) and Hawaiian petrel (<i>Pterodroma phaeopygia sandwichensis</i>) (E) from installation of wind generator. 	<ul style="list-style-type: none"> ■ Likely to Adversely Affect two federally listed species: Newell's shearwater (<i>Puffinus auricularis</i>) (T) and Hawaiian petrel (<i>Pterodroma phaeopygia sandwichensis</i>) (E) from installation of wind generator. 	<ul style="list-style-type: none"> ■ Not likely to Adversely Affect two federally listed species: Newell's shearwater (<i>Puffinus auricularis</i>) (T) and Hawaiian petrel (<i>Pterodroma phaeopygia sandwichensis</i>) (E)

Section 3. Environmental Setting and Consequences

The Laupahoehoe Research and Education Center site is referred to throughout this EA as the project footprint site (1 to 3-acre facility area). The 20-acre leased parcel in which the research and education center footprint will be located and the road accessing area is referred to throughout this EA as the project area.

This basic geographic setting of the project area includes the 20-acre parcel located at approximately 2,300 feet elevation and a section of the Manowaiopae Homestead Road which begins at

approximately 1,000 feet in elevation and traverses up to the research and education center facility construction site. Land along the road is primarily private and state-owned with scattered agricultural uses. The 20-acre parcel is bordered by state-owned lands including the boundary of the HETF.

The lowlands of the Laupahoehoe region, and the areas covering fourteen ahupua'a (land subdivisions), were sought for sugar plantations during the 1850s. By 1876, a full-scale plantation was incorporated and a mill established (Kumu Pono Associates 2006). The Laupahoehoe Sugar Company and Mill, secured fee-simple and lease-hold interest in lands of the Laupahoehoe vicinity. As the plantation developed, lowland forests up to about the 2,000 foot elevation were cleared for cultivation of sugar and for the development of flumes and water resources (Kumu Pono Associates 2006). As a part of the plantation development, and as part of the efforts of the government to encourage settlement in the Laupahoehoe vicinity lands, homestead lots were also developed (the lower boundaries of the forest reserve lands where the 20-acre leased parcel is located mark the edge of the homestead lots).

Climate, Geology, Soils and Hydrology

Existing Condition. The project area is located on the eastern, windward flanks of Mauna Kea. The orographic cloud formations account for the high rainfall rates and the afternoon fogs that occur in the area. Average annual rainfall in and around the proposed research and education center is about 160 inches (406 cm) (<http://www.fs.fed.us/psw/ef/hawaii/>). The average daily temperature is approximately 74 degrees F, with an average minimum of 63° F (17°C). Geologically, the project site is located on Mauna Kea and the surface consists of basalt lava dated between 4,000 and 14,000 B.P. years before the present (State of HI GIS data: <http://hawaii.gov/dbedt/gis/>).

Within the Laupahoehoe Project area there are three watersheds where project activity would occur: the Kilau Stream Watershed, the Kapili Stream Watershed, and the Laupahoehoe Stream Watershed. The 2006 State of Hawaii Water Quality Monitoring and Assessment Report (State of Hawaii, Department of Health, Environmental Planning Office 2008) was consulted to see if any of the project area streams are impaired based on the State of Hawaii water quality criteria. The report shows that all of the project area streams are meeting the water quality standards set forth by the State of Hawaii.

The dominant soil type within the 1 to 3-acre project footprint site where the research and education center facility will be constructed is the Kiloa Extremely Stony Muck on topography with 6 to 20 percent slopes. The Kiloa soil series consists of well drained, thin extremely stony organic soils over fragmental a'a lava. For a complete description of these soil types see the [Watershed and Soils Report](#). Field reconnaissance of the project footprint site in October 2008 (and the LHH project area as well) did not locate any existing wetlands or riparian vegetation.

Minor road realignment (about 12 feet, 3.7 meters) at the Kapili Stream crossing is proposed in Alternatives 2–5. This realignment would provide safer vehicle passage during high water events and eliminate other safety concerns related to the existing road undercut shown in [Figure 6. Site Photos of Road Re-alignment Area](#). The Kapili Stream is a 5 to 10-foot wide intermittent stream channel consisting of a boulder and cobble substrate. The vegetation in and around the stream and at the stream crossing site consists primarily of sugarcane (*Saccharum officinale*), Hilo grass (*Paspalum conjugatum*), vasey grass (*Paspalum urvillei*), and Glenwood grass (*Sacciolepis indica*). The USGS Real Time Water Data for Hawaii website (<http://waterdata.usgs.gov/hi/nwis/rt>) shows no past flow data for the Kapili Stream. From eyewitness accounts, it should be noted that the stream is known to be flashy. Flows approaching 6 to 10 feet above channel bottom elevation have been seen

(IPIF Staff 2008). The channel is stable, which bodes well for the proposed work that is planned for the site.

The Manowaiopae Homestead Road is the only access route into the proposed research and education facilities site. The road is maintained by the County of Hawaii and other private landowners who reside in the area. The road is paved in the lower portions before becoming a mixture of pavement and gravel shortly above the Kapili Stream crossing. The road is approximately 10 to 12-feet wide supporting regular four-wheel-drive high clearance vehicles. The road showed little to no areas of rill (removal of soil by concentrated water running through little streamlets) or gully erosion. There are areas with past evidence of minor sheet erosion but, overall, the road base was stable and drainage structures were functioning.

The facilities for the LHH research and education center are to be constructed within a 1 to 3-acre parcel of land. The northern area of the parcel is shown in [Figure 5. Site Photos of Facility Footprint Location and Drainage Structure, Low Water Crossing](#). According to the professional survey conducted by the Forest Service, the parcel has slopes between 5 to 15 percent. Slope stability for the site is not an issue and drainage at the site is rapid with no evidence of standing water or wetland vegetation

Laws, Regulations and Policies.

Clean Water Act: Section 404 of the Clean Water Act requires approval prior to discharging dredged or fill material into the waters of the U.S. in dealing with any of the following:

- Deposition (placement) of fill or dredged material in waters of the U.S. or adjacent wetlands.
- Site-development fill for residential, commercial, or recreational developments.
- Construction of revetments, groins, breakwaters, levees, dams, dikes, and weirs.
- Placement of riprap and road fills.

Executive Order 11990, 1977 (Wetlands Management): Requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. To comply with Executive Order 11990, the Federal agency would coordinate with the ACOE, under section 404 of the Clean Water Act, and mitigate for impacts to wetland habitats.

Executive Order 11988, 1977 (Floodplain Management): Requires all Federal agencies to take actions to reduce the risk of flood loss, restore and preserve the natural and beneficial values in floodplains, and minimize the impacts of floods on human safety, health, and welfare.

Mitigations and Management Recommendations. Mitigation measures are listed in Table 1. The Best Management Practices (BMP's) Manual for Construction Sites in Honolulu 1999 (Department of Environmental Services, City and County of Honolulu 1999) was consulted regarding implementation of BMPs for the project. Specific BMPs as listed in the [Watershed and Soils Report](#) are recommended to be implemented with this project. Implementation of these BMP's would insure protection of soil and watershed resources in the LHH project area into the future.

Determination of Effects. Implementation of the no action alternative would keep existing soil and water resource conditions static. There would be no disturbance to the stream channel and floodplain at the Kapili Stream crossing site. Further, there would be no road maintenance to the Manowaiopae Homestead Road and no disturbance would occur at the research and educational center facility

footprint site. Regardless of which action alternative is selected, soil and watershed effects would be the same and are described below.

Water Quality: There is the potential for a flush of sediment during construction of the low water crossing at the Kapili Stream, especially if construction is started and then interrupted by heavy rainfall that would produce a significant flow in the channel. It is recommended that construction occurs when heavy rains and stream flow are not likely. The work should not occur when the stream is flowing. This would reduce the risk of sedimentation to the Kapili Stream and protect water quality downstream.

Installation of the septic system at the facilities site would comply with all county building codes. Guidance from the County of Hawaii Health Department or the NRCS may be warranted for specific soil types.

Construction activities for the LHH facilities should not increase sediment in streams. The closest stream drainages are approximately 0.25 mile from the LHH project footprint site. Silt fencing is recommended around the construction site during construction and until the site has re-vegetated, any short-term sediment caused during the construction phase would be filtered out before reaching project area stream channels.

Road maintenance activities would benefit water quality. Improvements to road drainage on the Manowaiopae Homestead Road would reduce the minor sediment yield currently entering project area streams from the road.

Trenching for power lines would not cross any streams and therefore would not cause erosion and subsequent sedimentation to project area streams.

Soils: There would be some impacts to soils at the LHH project footprint site. There would be a permanent allocation of the soil resource to construct the facilities. At most, 3 acres would be allocated. With HETF lands located in the watersheds above, and State and county lands located just below, it is not expected that major allocations of other soils in the area would occur, making this a very minor overall impact to the soils resource in the area.

There will be minor impacts to the stream channel/floodplain at the Kapili Stream crossing. The channel would be excavated upstream of the current crossing approximately 12 feet, which would disturb approximately 0.01 acres. Excavation would occur so that pavement could be placed to match the current stream gradient at the site. The flow capacity of the stream would not be compromised with this activity. The channel roughness would be changed at this site, but 12 to 15 feet of stream channel is so minor that it would not be detectable at a watershed scale. For these reasons, Executive Order 11998 would be followed.

Conclusion: Alternatives 2–5 are in compliance with all laws, regulations, and policies associated with soil and water resources. Negligible impacts are expected from any of these alternatives because implementation of any action alternative is required to follow applicable Federal and county regulations and policies related to stream channel alteration, drainage, and septic systems. Additionally, implementation of BMPs for construction would further protect resources.

Fauna

Existing Condition. There are only two native mammals on Hawaii, including the Hawaiian hoary bat (*Lasiurus cinereus semotu*) and the Hawaiian monk seal (*Monachus schauinslandi*). Because the project site is over 3 miles from the coast, there are no anticipated impacts to any marine mammals or

sea turtles. Hence, the analysis presented will focus on the Hawaiian hoary bat and any bird species potentially affected.

In order to assess bird diversity on the Laupahoehoe Research and Education Center site, bird surveys were conducted in October 2008 by the University of Hawaii. The survey area included approximately 23 acres, including the 20-acre leased site and the Manowaiopae Homestead Road corridor. See [Wildlife Report](#) for survey parameters and results. A total of 17 species were documented during the two days of surveying including 4 native/endemic species and 13 non-native species (see Table 1, [Wildlife Report](#)). While the lease site contains a mix of open and forested habitat including both native and nonnative vegetation, habitat along the road includes a much larger component of openings and grassland/agricultural habitat.

The proposed facility construction site (20-acre lease site) and the disturbance history of this site also affect the habitat suitability of many species. For example, historically, the federally endangered Hawaiian honey creeper (*Oreomystis mana*), Hawai'i `Ākepa, (*Loxops coccineus coccineus*) and `akiapōlā`au (*Hemignathus munroi*) occupied koa/`ōhi`a forest in this area. However, due to past development described previously and conversion of native forest in combination with habitat degradation caused by feral ungulates suitable habitat for these and many other native wildlife is now restricted largely to upper elevation habitat (HETF area), which has received less degradation. For more information regarding past occurrences in the area see the [Wildlife Report](#).

Laws Regulations and Policies. The following laws, regulations, and policies apply to wildlife resources associated with all alternatives.

Endangered Species Act of 1973 (ESA): The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. Under provisions of the ESA, Federal agencies are directed to seek to conserve endangered and threatened species and to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats.

Migratory Bird Treaty Act (MBTA) of 1918 (Executive Order 13186) (MBTA): The MBTA established an international framework for the protection and conservation of migratory birds. This act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird.” Within the NEPA process, effects of proposed actions on migratory birds will be evaluated and actions will consider approaches to identify and minimize take (USDA FS 2008).

Hawaii Revised Statutes (HRS) Chapter 344-4; Item 3: Flora and Fauna: The purpose of this regulation is to protect endangered species of indigenous plants and animals, ensure that any introduced species would not result in ecological hazards, and foster the planting of native vegetation. Any activities proposed must analyze and evaluate effects to endangered species, their critical habitat and native vegetation.

State of Hawaii Department of Land and Natural Resource (DLNR): The State DLNR, Division of Forestry and Wildlife (HAR § 13-124; HRS 195D) provide direction to conserve, manage, protect, and enhance indigenous wildlife and managed introduced birds. This is accomplished through Hawaii's Comprehensive Wildlife Conservation Strategy (CWCS), which is used to identify species in the State of greatest conservation need. http://www.state.hi.us/dlnr/dofaw/cwcs/Conservation_need.htm

Mitigation and Management Recommendations. Mitigation measures are listed in Table 1.

Methodology and Impact Analysis. In order to determine the scope of analysis, a preliminary evaluation including recent documentation of species occurrence, presence of habitat in or near project area, or species affected by proposed alternatives was conducted for each potentially affected species. Fourteen species were evaluated in detail including federally listed threatened (T) and endangered (E) species, as well as Hawaii's Species of Greatest Need (SOGN) that have been documented in the last 20 years, or which have suitable habitat on the Laupahoehoe site ([Wildlife Report, Table 3](#)).

Determination of effects used a three-step process including, site assessment, wildlife screening and habitat species assessments to identify and assess potential impacts to wildlife and wildlife habitat. These processes are outlined in the [Wildlife Report](#).

Determination of Effects. The effects to wildlife in general are described below by alternative. Following this description is a list of effects to federally listed threatened and endangered species and Hawaii SOGN that could be impacted by proposed alternatives.

Alternative 1

Because there are no activities proposed under this alternative, there will be no direct effects to wildlife. The Laupahoehoe Research and Education Center site was chosen because of its unique values and its proximity to HETF. Also, the site is located on lands managed by State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, a cooperator with IPIF and HETF. Public education and demonstration provided by HETF is a key component of maintaining Hawaii's native biodiversity (http://www.state.hi.us/dlnr/dofaw/cwcs/what_is.htm), as well as the recovery of many of threatened and endangered species (USFWS 1998; USFWS 1984; USFWS 2004; USFWS 2005; USFWS 2006). Under this alternative, no facilities would be constructed. While another site away from HETF would likely be selected at some point in the near future, selection of this alternative may somewhat delay or reduce educational/demonstration opportunities as compared to the action alternatives.

Because there are no direct effects and only short-term indirect effects, there are no cumulative effects to wildlife anticipated under this alternative.

Alternatives 2–4

Facility Construction: Construction of proposed facilities would result in a small loss of predominately nonnative vegetation/habitat. Protection of native trees in combination with restoration of native vegetation will improve habitat conditions on portions of the site, and overall, there would be little change in habitat due to the proposed activities.

Effects on wildlife include short-term disturbance (one season) and avoidance by mobile species on the affected area, and possible mortality to less mobile species that occupy the understory (grasses and shrubs) on the areas actually disturbed. Mortality of young/eggs of any cavity or tree roosting/nesting species would be greatly reduced or eliminated with implementation of WL-1 that prevents any tree removal during much of the breeding season (May 1 through July 31). As a result, effects to these species would consist largely of short-term (one season) avoidance. Also, because only a small portion of the site (2 to 3 acres) would be affected and 95 percent of the native trees unaffected, there would be adequate suitable habitat for all wildlife that use the area. Therefore, any direct and indirect effects are of limited extent and insignificant.

Power to Facility. Under these alternatives power for the facilities would be supplied by extension of electrical lines from existing service adjacent to the Manowaiopae Homestead Road. Portions of electrical service would be buried on approximately 0.3 miles to mitigate visual impacts. Some overhead lines would be necessary at the facility site.

Effects to wildlife include short-term (one season) behavioral avoidance during construction. Also, because power lines provide perching, roosting, and nesting structures, raptors and other birds are attracted to them, which can result in impacts (collision and electrocution) (Avian Power Line Interaction Committee [APLLC] 2006).

Body size is one of the most important characteristics that make certain species susceptible to electrocution. Outstretched wings or other body parts that span the distance between energized conductors make electrocution risk much greater for large birds; although small birds can be electrocuted on closely spaced energized equipment such as transformers. However, implementation of avian protection guidelines (WL-7 in Table 1, [Wildlife Report](#)) is expected to effectively eliminate potential impacts to the Hawaiian hawk and other native songbirds. Considering all powerlines will be constructed within an existing road corridor, and considering the small amount of affected habitat, direct or indirect effects are insignificant.

Fencing. Ungulate-proof fencing is proposed on up to 3 acres. The fence would be 4 to 6-feet tall and made of steel posts and steel or galvanized wire. The width of fence stays on the bottom will be narrow (1 by 1 inch) and may be used to restrict or prevent access for some nonnative predators. To construct the fence, trimming of vegetation with hand operated tools (such as handsaw, machete, weed eater, or chainsaw) would be completed on a 6-foot-wide corridor. Fence construction would involve driving posts into the ground on approximately a 10 -foot spacing, with the fence being attached to the outside of the posts. The bottom of the fence may be buried or secured to prevent access from ungulates. Fence construction may also involve some removal of trees for fence construction, as well as trees that are close to and may fall on the fence.

Like the facility construction, effects to wildlife include short-term disturbance of mobile species and/or possible mortality to less mobile species affected by clearing the fence line (approximately 0.25 acres affected). However, mortality-related impacts would be minimized with implementation of WL-1, restricting tree removal during much of the breeding season (May 1 through July 31). The fence itself can be a hazard to wildlife striking or becoming entangled in it. Injury is greatest, however, from fences constructed with barbed wire or other sharp edges. Implementation of WL-3 requires that the top wire or the portion of the fence most likely to be struck consist entirely of smooth wire, which greatly reduces potential for injury. To ensure that this mitigation measure is effective, the fence line will monitored for a period of 3 years, and appropriate mitigation measures implemented if necessary (WL-7 in Table 4, [Wildlife Report](#)).

Cattle and feral ungulates would be excluded from the site, which would help restore native vegetation on disturbed areas. Although only a small area (up to 1.5 acres) would be affected by the re-vegetation/fencing, it would be the first time in over 100 years that the site would not have been exposed to grazing. Consequently native herbaceous and woody vegetation could become re-established and provide habitat for native birds. Small native plant demonstration gardens are expected to be developed for educational purposes.

In summary, although some adverse affects associated with fence construction are possible, fencing out nonnative ungulates is recognized as a key wildlife restoration effort (USFWS 2006), and this, in combination with the educational component associated with the site, would be expected to provide long-term benefits to wildlife.

Transportation/Road Activities. Although disturbance-related effects to wildlife would occur during construction, these would be limited to the construction period (a few months). All except 25 feet of the proposed road work would occur within the existing right-of-way, and since wildlife are acclimated to use on the road, effects would be minor (short term) and localized.

Alternative Energy.

Solar Panels. There will be little if any additional disturbance associated with the installation of solar panels other than what was described under facility construction. While panels/storage units would be raised above the ground/roof a few feet, they would be readily visible. Also, due to their close proximity to other structures, it is unlikely that wildlife would strike a collector/storage unit. As a result, installation of solar panels would pose little if any direct impacts to wildlife and effects would be considered discountable. There are no indirect effects from solar panel installation anticipated.

Wind Energy. Installation of a wind generator would serve as a demonstration of a green alternative that can be used to reduce pollution. Initially, three wind generators were being considered for use on the site. However, due to potential impacts to threatened or endangered species, only a single wind turbine is proposed.

Direct effects on wildlife from tower installation include disturbance and avoidance of the immediate area while the tower is being installed. However, any disturbance during installation would only occur for a few days and would be short term and only affect a small area. Direct effects to wildlife in the form of mortality from operation of wind turbines are well documented (Kunz et al. 2007; Johnson et al. 2004; USFWS 2003; Arnett et al. 2008); birds and bats can be killed by collisions with wind turbine rotors or towers. See [Wildlife Report](#) for a full description of impact to birds and the Hawaiian hoary bat.

Potential risks of collision are reduced by implementation of project mitigations that increase visibility of the tower/turbine and curtail wind generation in the evening, when risk of collision would be greatest.

Indirect impacts to birds and bats from wind turbines can occur in the form of disruptions of foraging behavior, breeding activities, and migratory patterns resulting from alterations in landscapes used by nocturnally active birds and bats (Kuntz et al. 2007). Due to the small amount of habitat affected and the continued availability of suitable habitat on the lease, any indirect effects are of limited extent and discountable.

In summary, effects to wildlife from wind generators are well documented, and under Alternatives 2–4, installation of the proposed wind generator has the potential to result in mortality to wildlife. However, based on the above analysis and the following rationale, particularly implementation of project mitigation measures that curtail use during high risk periods and increase tower/turbine visibility, potential direct impacts to wildlife are greatly reduced.

Alternative 5

Effects to wildlife under this alternative would be similar as those described under the other action alternatives (Alternatives 2–4), except that anticipated effects from the wind turbine described above would not occur.

Summary of Impacts to Federally Listed Species and Hawaii Species of Greatest Needs. Impacts to individual species are analyzed in the [Wildlife Report](#). Determination of impacts combine

methodology of impact analysis as described previously with mitigation measures outlined in Table 1. Based on analysis presented in the wildlife report, there would be no effects or impacts from any alternative to the endangered Hawaii crow; ‘alalā (*Corvus hawaiiensis*) or the following Hawaii Species of Greatest Concern: short-eared owl; Pueo (*Asio flammeus sanwicensis*) Hawaii 'elepaio (*Chasiempis sanwicensis sandwichensi*), and Hawaii thrush; ‘Oma’o (*Myadestes obscurus*). Table 3 summarizes the alternative effects determination for the Hawaiian hoary bat, Hawaiian hawk, Hawaiian duck, Hawaiian goose; Nēnē, ‘Apapane, ‘I‘iwi and Hawaii ‘Amakihi.

Table 3. Impacts to Federally Listed Threatened and Endangered Species and Hawaii Species of Greatest Need

Species	Alternative 1	Alternative 2–4	Alternative 5
Threatened (T) and Endangered (E) Species			
Hawaiian hoary bat (E) <i>Lasiurus cinereus semotus</i>	NE	NLAA	NLAA
Hawaiian hawk; (‘Io) (E) <i>Buteo solitarius</i>	NE	NLAA	NLAA
Newell's Shearwater (‘A‘o) (T) <i>Puffinus auricularis</i>	NE	LAA	NLAA
Hawaiian Petrel (‘Ua‘u) (E) <i>Pterodroma phaeopygia sandwichensis</i>	NE	LAA	NLAA
Hawaiian duck; (Koloa Maoli) (E) <i>Anas wyvilliana</i>	NE	NLAA	NLAA
Hawaiian goose (Nēnē) (E) <i>Branta sandvicensis</i>	NE	NLAA	NLAA
Hawai'i Creeper (E) <i>Oreomystis mana</i>	NE	NLAA	NLAA
Hawaii Species of Greatest Need			
‘Apapane <i>Himatione sanguinea sanguinea</i>	NE	NEP	NEP
‘I‘iwi <i>Vestiaria coccinea</i>	NE	NEP	NEP
Hawaii ‘Amakihi <i>Hemignathus virens virens</i>	NE	NEP	NEP
NE – No Effect NLAA – May Affect, Not Likely to Adversely Affect LAA – May Affect, Likely to Adversely Affect NEP– No Effects to Local Populations			

Cumulative Effects

Alternative 1: Anticipated cumulative effects were evaluated by looking at effects of activities that occur within 0.25 mile of the lease or affected road corridor. Anticipated changes in land use and future activities (next 2 to 5 years) within the analysis area are summarized in the Cumulative Effects section of this document and discussed in the [Wildlife Report](#). Because there will be few changes in existing use or habitat conditions, and considering the small size and localized nature of the activities anticipated in the future, there are no significant cumulative effects to wildlife or wildlife habitat anticipated under Alternative 1.

Alternatives 2 through 5: Cumulative effects under Alternatives 2 through 4 include activities described under Alternative 1 and direct and indirect effects described above under these alternatives. Although activities proposed under the action alternatives would affect habitat on up to 3 to 5 acres and increase disturbance into and at the lease, based on the analysis of direct and indirect effects, implementation of Alternatives 2 through 5 would not measurably contribute to any other past, current, or reasonably foreseeable future activity that would result in significant effects to wildlife.

Conclusion: Alternatives 2–5 are in compliance with all Federal and State laws, regulations, and policies associated with wildlife including consultation with the USFWS. Mitigation measures developed reduce impacts to wildlife including federally listed species; however, even with implementation of these measures there may be impacts to Newell's shearwater and the Hawaiian petrel from the installation of the wind generating tower associated with Alternatives 2, 3, and 4. Alternative 5 (no wind generation) in combination with implementation of mitigation measures would result in little or no impacts to wildlife or State listed species, and no adverse effects to federally listed species.

Flora

Existing Condition. The vegetation along the road accessing the administrative facilities is mostly open pasture with introduced grasses dominating the understory with native and nonnative canopy and sub-canopy trees scattered throughout. A portion of the road corridor runs through a stand of planted eucalyptus trees (*Eucalyptus grandis*). The vegetation within the 20-acre leased parcel is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia umbellifera* and *Acacia koa*) with thickets of non-native trees (*Toona ciliata*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*). Open areas are dominated by pasture grasses. The area where the 20-acre leased parcel is located has been actively grazed by cattle for the past 30 years (Imoto 2009).

Laws, Regulations, and Policies. The following laws, regulations, and policies apply to botanical resources associated with all alternatives:

Endangered Species Act of 1973 (16 U.S.C. 1531-1544): The law requires Federal agencies, in consultation with the USFWS to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species.

Executive Order 13112: This order, in combination with other Acts (<http://ceq.hss.doe.gov/nepa/regs/eos/eo13112.html>), prevents the introduction of invasive species and provides for their control; and minimizes the economic, ecological, and human health impacts that invasive species cause.

Hawaii Revised Statutes (HRS) Chapter 344-4; Item 3: Flora and Fauna: (1) Protect endangered species of indigenous plants and animals and introduce new plants or animals only upon assurance of negligible ecological hazard; and (2) foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment.

Mitigations and Management Recommendations. Mitigation measures for invasive species and native vegetation are described in Table 1 of this document. Management recommendations include preservation of native *Pisonia umbellifera* trees to the fullest extent possible.

Methodology and Impact Analysis. Pre-field review of the project area was conducted to determine occurrences of federally and state listed species and habitats. Field surveys were conducted by Hawaii Division of Forestry and Wildlife district botanist on October 13, 2008. No threatened,

endangered, or rare plant species or habitats were identified within the area. For a complete review of existing conditions, survey parameters, and species identified during the survey see the botanical assessment and [Botany Report](#).

Determination of Effects. No direct, indirect, or cumulative impacts to federally listed plant species or rare plant species would occur from any of the alternatives because no habitat or plant species were identified. Mitigation measures associated with invasive species in addition to revegetation with native species after construction would likely create additional native plant habitat.

Conclusion: All alternatives are in compliance with laws, regulations, and policies associated with botanical resources. No impacts are expected to federally listed or State rare species because none were identified during field surveys. Mitigation measures including those associated with invasive species and revegetation with native species would result in beneficial impacts to the area.

Scenery

Existing Condition.

Landscape Character Description. Landscape character represents distinct attributes of landform, vegetation, surface water features, and cultural features that exist in the landscape. In the largest context of place, the Hawaiian Islands are considered to be one of the most unique places on Earth. The extreme isolation of the islands produced, through evolution and specialization, a remarkable diversity of species found nowhere else on the planet. These natural treasures are integral elements of the biological and cultural heritage of the Hawaiian Islands and their people.

Although the project area described within the EA constitutes the 20-acre parcel of land where the research and education center facilities will be constructed and the Manowaiopae Homestead Road corridor, from the scenic perspective the project site for the center lies on the lower northeasterly facing flank of Mauna Kea, up slope (mauka) of the Hamakua coastline in the District of North Hilo. The project site is bounded by the town of Laupahoehoe and the Pacific Ocean to the northeast, and Laupahoehoe Gulch on the north. The summit of Mauna Kea rises approximately 13,800 feet above sea level to the southwest of the site, although views of the mountain are obstructed by vegetation, topography, or both. Lava rock extrusions and overland flows create interesting texture and color in the landscape; the lava is gray to black when recent, and shades of brown on exposed and weathered surfaces. For a complete discussion of the unique landscape characteristics that comprise this broader analysis area see the [Scenery Report](#).

The landscape down slope from the proposed site through which the access road passes is abandoned sugar cane plantation land ([Figure 8. Site Photos of Scenic View and Road Corridor](#)). When this land was actively used for agriculture, the landscape appeared as rural/farming. Now the landscape has transformed into a patchwork of wild cane, pastures, and invasive grasses, with several riparian drainages and a stand of eucalyptus trees remaining from a previous commercial timber operation. The road winds along the slope, and as it approaches Laupahoehoe, scattered Hawaiian-style houses appear on acreage lots, surrounded by a variety of vegetation types. The style known as Hawaiian plantation architecture has become a signature style for Hawaii and is the most recognizable Hawaiian style featuring low-profile wood frames, vertical plank siding, and large porticos (lanais). Roofs are distinguishable parts of Hawaiian plantation structures, wide-hipped or bell cast with eaves that are deep bracketed. When viewed against the natural Hawaiian environment, Hawaiian plantation structures blend easily with their surroundings. The style gets its name from the sugar and pineapple plantations which employed the design for laborer homesteads.

All along the access road the view of the ocean is sweepingly dramatic, although intermittently obstructed by high grasses and eucalyptus trees. From this elevation, it is possible to watch weather fronts move in across the ocean and observe ocean vessels along their route in between islands. Ocean views, while common on all islands, are always highly valued and on the Big Island tend to increase financial value of property. The Hamakua Coast, from near Waipio Valley to Hilo Bay, is comprised of a sea cliff 100 to 300 feet high; this highly valued scenic element, while an extremely important to the area's character, is below the viewing plane and cannot be seen from either the road or the building site.

Seen Area Integrity of the Access Road and Proposed Research and Education Center Facility Site:

The road alignment is either on or cuts through private land; only on the State lease parcel is it on public land. The beginning of the project at the wooden bridge is at the very edge of the residential development of the town of Laupahoehoe. Residential buildings are typical of local architecture. The road itself is the viewing plain from which the narrow corridor is observed, views of the surrounding fields and out to the ocean occur intermittently, but the vegetation at the lower elevations and through the eucalyptus plantation creates a "hall" type of view. The road winds considerably creating a sinuous feeling as the viewer passes through. As the road reaches the project site it opens on to more forested landscape, one more open than the natural forest because it is maintained and used as pasture. The last structure on the road is 1.5 mile uphill (mauka) from the bridge; fencing, gates and occasional rusting equipment left from the cane plantation dot the corridor. Cows stand and walk on the road, as do wild pigs occasionally, and birds can be seen all along. The valued view from the road and adjacent properties is north and sometimes northeast to the ocean

The proposed project building site is also pasture and thus more open than the forest unit—the wall of thick vegetation along the Laupahoehoe forest unit boundary is visually evident, dark and unwelcoming, and the more open views of meadows with individual and clumps of trees is a main characteristic of the site. Herds of cows stand and move across the site because a watering pond is in the south quadrant; often the ground is disturbed by the cows or wild pigs. Internal views on the site are of Ohia and Pisonia trees, guava, shrubs and grass grazed to a few inches. It is possible to see out to the ocean from several points within the 20 acres, the view is limited and at a distance, but on a clear day an amazing spot of periwinkle blue. The terrain slopes moderately toward the north/northeast with two small drainages that are rutted with lava protruding along the edges, but the outcrops are not features because they are covered by vegetation and common in this landscape. The Hamakua Coast, while an extremely important to the area's scenic character, is below the viewing plane and cannot be seen from either the road or the building site. The valued view is the native vegetation.

Laws Regulations and Policies. The following laws, regulations, and polices apply to scenic resources associated with all alternatives.

Hawaii Administrative Rules title 11, Dept of Health, chapter 200, sub chapter 6, line (b) item 12:

The State of Hawaii's planning directions state an action will have a significant effect if it "substantially affects scenic vistas and viewpoints identified in state or county plans or studies". Therefore the Hawaii County regulations identifying and guiding scenery management are important to this evaluation.

Hawaii County General Plan: The Hawaii County General Plan states in Chapter 7-Natural Beauty:

"Natural beauty is a multifaceted resource. It is an aesthetic resource experienced by human perceptions. It is an economic resource, as evidenced by the scale of resort development and by visitor-related activities. Real property values further substantiate the economic value of Hawaii's dramatic beauty." Also, further in the introduction it says landscapes are "fragile and although often

enhanced by man can easily be adversely affected. Measures must be taken to insure its protection, both now and in the future, for the enjoyment of Hawaii's residents and visitors.” General Plan items that relate to evaluation of action alternatives include:

- 7.2 Goals: (b) Protect scenic vistas and view planes from becoming obstructed.
- 7.3 Policies: (b) Develop and establish view plane regulations to preserve and enhance views of scenic or prominent landscapes from specific locations. (e) Develop standard criteria for natural and scenic beauty as part of design plans.
- 7.4 Standards: (b) Coastline areas of striking contrast, e.g., Laupahoehoe Point.
- 7.5 Districts, North Hilo: “One of the most outstanding areas of natural beauty in North Hilo is Laupahoehoe Point. The point juts out calmly, ending in a rugged coastline with pounding surf in either direction along the coast are views of the high cliffs. The deep gulches with silvery green Kukui trees contrasting with the darker green vegetation along the highway are also points of natural beauty”.
- Kilau Gulch and Laupahoehoe Gulch are listed in North Hilo District as “Natural Beauty Sites” these gulches essentially bracket the project road and building site and are part of the setting for the project.

Chapter 11, Public Utilities, part 4, Electricity: 11.4.2 Policies (a) power distribution shall be placed underground when and where practical; 11.4.3 Standards (a) there shall be minimal obstruction of scenic views and vistas by electrical facilities.

Forest Service Scenery Management Direction: This does not officially apply because the land is not under Forest Service management; however, because the Forest Service is a cooperating partner in HETF, the Forest Service Scenery Management System (SMS) has been applied as a descriptive and organization scheme for the project evaluation. The land management partner, State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife does not typically evaluate and manage scenery, but incorporates county rulings when appropriate.

Mitigation and Management Recommendations. Public scoping determined there was an issue regarding power lines in view plane of local landowners. This issue was considered to be significant enough to incorporate into the design of Alternative 2—electrical power lines would be buried in the location where they cross the most sensitive view; the view to the north/northeast, perpendicular to the road and power lines following the road looking at the ocean.

In addition, there are recommendations concerning management for this project: When pruning trees and vegetation adjacent to the road for clearance, vegetation should be feathered and trimmed to various heights in undulating lines to replicate natural growth patterns. When trees are removed from the building site, it is important to avoid dragging boles over road banks. Landscape contours changed by tree removal or construction should be restored to natural shape, and disturbed areas should be reclaimed by planting or seeding with natives. Residue or slash should be removed from the building site and grounds; although some plant material can be crushed and spread so that it appears like natural ground cover. Buildings should follow the locally accepted plantation architectural style and use carefully muted and blended colors, textures, and forms.

Methodology and Impact Analysis. The evaluation relies on field studies and photography from inventoried viewpoints and other views of the project area, as well as consideration of public preferences for scenic quality. Scenery is valued by the State, county, the local community, and is important to the HETF.

Analysis Issue: Natural landscape appearance without obstructions or anomalies.

Indicators: (1) Natural appearing scenery, (2) intrusion of visual anomalies, and (3) changes to existing roadsides and forest landscape.

Type of Impact:

Adverse: Activities that lead to the temporary intrusions in to the scenery, or long-term change in scenic integrity of the vista; and/or temporary presence of mechanical equipment in a localized area.

Beneficial: Activities that enhance the scenic experience including opening of vistas and opportunities for enhancement to the scenery by increasing native vegetation.

For a complete description of intensity, context, and duration of impacts that include the terms *negligible, minor, moderate* and *major, regional, local, long term* and *short term*, see the [Scenery Report](#).

Determination of Effects. The no action alternative would result in no immediate, discernable change to the visual resource, and little perceived change for the future. The existing road corridor would remain as is with no improvements and the proposed site would stay as pasture/forest. Without the proposed intense maintenance improvements to the road it would decline further, increasing the deteriorated appearance of the road.

Alternative 2

Multiple buildings, parking lot, helipad, infrastructure, solar panels, and utilities proposed on 1 to 3 acres in the 20-acre site would change the appearance in the foreground from forested pasture and native tropical forest to that of rural development (see [Scenery Report attachment A](#) for appearance simulation). The desired scenic character for the project area includes two elements: the blending of built structure into the forest surrounding so as not to diminish the natural aesthetic and to use an architecture style fitting into the Laupahoehoe (Lava Leaf) place, including the nearby rural community. If the buildings proposed follow the locally accepted and encouraged plantation architectural style and use carefully muted, blending colors, textures and forms, the development would be suitable for the locale and relate visually to the town. This area has a very limited viewing audience: a few ranchers and hunters, and the research scientists. In the future, access would remain limited (not public) and the majority would be the scientists, researchers, educators and their audiences using the structures.

The effect is long term, local, and major to the immediate foreground. Middle and far ground views have no effect because the vegetation and topography screen the site from view. There are similar built environments nearby (2 to 4 miles) and if more development is deemed undesirable then the change would be considered adverse; alternatively, if the change is deemed appropriate based on the desired research facilities and in keeping with the rural atmosphere of the locale, then the change would be considered beneficial. Re-vegetation with native plants, removal of invasive species in the site, and limiting the removal of large trees would be a beneficial, long-term effect to scenery.

The separate location of the wind generator in the pond area of the site would be observed by few in the immediate foreground, but the size is scaled to the standing tree scale. The effect is moderate, adverse, long-term effect to the scenery in the immediate foreground.

Electric power lines installed to the proposed development site would place poles and lines in the immediate view of visitors traveling the road, but more importantly intruding into the scenic view from properties along the road. These views are valued at all times and seasons by residents, visitors,

researchers, and educators alike; these audiences though not large in numbers, have a keen interest in the scenery. This has been identified as an issue for this project. Various County directives include value statements for scenery specifically stating in a subchapter on electric lines that poles and lines should avoid interrupting scenery when possible.

From the connection point to the wooden bridge (approximately 1,000 feet), then in the project area from the bridge to the low water crossing, lines and poles in the right-of-way would be an adverse, minor, long-term change to the visual environment. Such lines already exist in the neighborhood; the views are common of the character type and are primarily obscured from the road to the ocean, not across the road from adjacent properties. The electric power from the low water crossing to the sharp turn up the slope (approximately 1,751 feet or 0.33 mile) would be under ground and have no effect to the view along the road, or any effect in the scenic view from the properties up from the road with views to the ocean. From the turn, running up-slope to the proposed building site, the lines and poles in the right-of-way would be an adverse, long-term, moderate change to the visual environment; there are no utilities nearby and the linear element would change the road side appearance and add a built image to the environment. Where the poles are within the eucalyptus plantation they would blend with the trees and not be evident. In this location, pruning practices as outlined in management recommendations would limit impacts.

Improvements to the road surface would be beneficial, but negligible in regard to scenery because the appearance of the road would not change in view of the common observer and the road is not part of the scenic view. The low water crossing would be a beneficial, long-term effect—the added safety features of water depth indicators and a safer road bed would be seen by motorists as improvements.

Cumulative scenic quality is within the seen area of the proposed site boundary and the road corridor from the electrical connection to the building site. Past, ongoing, and future activities associated with this project are outlined in the Cumulative Effects section of this document. Based on these activities, there would be no cumulative effects to the foreground, middle ground, or far ground views from this alternative combined with those actions. The potential increase in linear forms with additional towers encountered in the forest is a change in the natural appearance, but the thick vegetation cover conceals them except for the immediate foreground at the site of each tower so the change remains negligible, though long term. Any actions regarding vegetative management resembling natural condition for this land adjacent to the forest unit would be beneficial, long term, and regional.

Alternative 3

The effects of this alternative would be consistent with the effects cited in Alternative 2, except electric power poles and lines from the wooden bridge to the sharp turn heading up hill (approximately 1,751 feet or 0.33 mile) would be a long-term, moderate adverse effect to the view along the road and a long-term, major adverse effect to the scenic view from the property paralleling the road with views north/northeast to the ocean. The existing view from the property along this stretch is now clear to the ocean and because the terrain slopes dramatically down from the road there is no potential of other intrusions into the view. The terrain does slope upward, south from the road, and at higher elevation the view plane would be above the height where poles and lines would be seen. The determining factor for this evaluation is the view plane from within 50 feet of the road. See [attachment A, Scenery Report](#), for comparison of existing views and views with poles and lines. Cumulative effects would be the same as Alternative 2.

Alternative 4

The effects of this alternative would be consistent with the effects cited in Alternative 2, except there would be no impact to scenery from the installation of electrical lines and poles along the road or at the site. Generator for electrical power located within the developed site would not impact scenery more than the effect of the buildings and infrastructure as discussed in Alternative 2. Cumulative effects would be the same as Alternative 2.

Alternative 5

The effects of this alternative would be consistent with the effects cited in Alternative 2, except there would be no impact to scenery from a wind generator tower in the pond area. Cumulative effects would be the same as Alternative 2.

Conclusion: All action alternatives take into consideration all the State and county rules, plans, and Federal direction set forth for scenery management. Although there are areas near the project that are considered natural beauty sites within the Hawaii County General Plan, they are not visible from the project site. The project site is not noted for its natural beauty in the Hawaii County General Plan. Underground burial of electrical power lines along the scenic view accessing the research and education center in combination with management recommendations would reduce scenic impacts associated with the preferred alternative (Alternative 5) to local residents and visitors to the project area.

Air Quality

Existing Condition. Air pollution on the Big Island is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic haze (vog) that persistently blankets the north and south Kona areas. Depending on wind directions, the Hilo area can also experience some vog conditions. The existing trade winds in and near the Laupahoehoe area provide excellent air movement. This coupled with low density of population in the area provides very good air quality.

Laws, Regulations, and Policies. The following laws, regulations, and policies apply to air quality resources associated with all alternatives.

Hawaii Administrative Rules, Chapter 59 Code of Federal Regulations, Title 40, Part 50

Determination of Effects and Conclusion. Equipment associated with construction and road improvement activities as outlined in Alternatives 2–5 are not expected to exceed State ambient air quality standards (HAR 59, Title 40 Part 50) and would not have any direct or indirect effects on air quality.

Noise

Existing Condition. Noise levels at the proposed research and education center are minimal except for vehicles that drive by the area to access HETF. All gates to the area are locked and access to the area is limited to State, Federal, and permittees.

Laws, Regulations, and Policies. The following laws, regulations, and policies apply to noise associated with all alternatives:

State of Hawaii Department of Health, Title 11, Chapter 46, HAR (Community Noise Control)

Mitigations and Management Recommendations. Whenever construction noise is expected to exceed the Department of Health's (DOH) "maximum permissible" property-line noise levels,

contractors will be required to consult with DOH per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction.

Determination of Effects. Activities associated with this project such as road work, trenching, and use of heavy equipment during construction would likely increase noise levels in localized areas for short periods of time. These activities may occur at different times during the construction phase of the project. During this short duration time periods it possible that noise levels from equipment such as jackhammers, pile drivers, and chain saws may reach noise levels of 120 decibels. Approved community noise permit or variance would be obtained as required by the Hawaii State Department of Health (<http://hawaii.gov/health/environmental/environmental/noise/noisesection/>). DOH would then review the proposed activity, location, equipment, project purpose, and timetable in order to decide whether a permit is necessary and what conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers, would be necessary.

Noise generated from the installation of a propane generator as outlined in Alternative 4 is estimated to be between 60 to 75 decibels (Swienton 2009). This noise level is comparable to busy traffic, a dishwasher, or a vacuum cleaner (ASHA 2009). Sounds louder than 80 decibels are considered potentially dangerous; however, the amount of noise and the length of time of exposure determine the amount of damage (2009). The placement of this generator would be outside and adjacent to the living areas and is expected to be considerably less to persons residing and visiting the center. Noise from installation of a propane generator would not impact private landowners nearby because vegetation surrounding the center would buffer noise levels to lower than at the site location and the nearest resident is more than 0.25 mile away.

Conclusion: Noise associated with construction activities proposed in all action alternatives are expected to be minor and short term. If noise levels exceed DOH permitted levels, a community noise permit or variance would be obtained from the DOH to reduce any potential short-term impacts. All other noise generating equipment associated with the center (for any alternative) would not exceed DOH standards.

Hazardous Substances

Existing Conditions. According to the archeological report (Heritage Report) there is a 1963 automobile that was likely left on the property on or about 1969. It is possible that there were hazardous substances associated with the dumping of this vehicle such as a battery, oil or gasoline. Recent site visits did not indicate presence of any other these materials.

Determination of Effects and Conclusion. Since this area in the past has been agricultural in nature, and historically not used for industry or a dumping ground, the history of the area does not suggest the presence of hazardous materials in general or any problems associated with exposure to the public during construction or long-term presence of the center.

Socioeconomic and Cultural

Cultural and Archaeological Resources

Existing conditions from a cultural and archeological resource standpoint are similar to those discussed in the Flora section of this report.

Laws, Regulations, and Policies. The following laws, regulations, and polices apply to heritage, cultural, and historic resources associated with all alternatives.

- This analysis is in conformance with regulations of the National Historic Preservation Act (NHPA), 1966, as amended (P.L. 89-665, 80 Stat. 915); the National Environmental Protection Act (1969); Archaeological Resources Protection Act of 1979 (ARPA); Native American Grave Protection and Repatriation Act (1990: P.L. 101-601); and American Indian Religious Freedom Act (1978: P.L. 95-341).
- Forest Service Manual 2360.1 outlines the applicable laws, regulations, and Executive orders complied with during this analysis. Although written for, and primarily applicable to, National Forest System lands, these laws, regulations, Executive orders, and stipulations will be considered for Laupahoehoe alternatives as well. Plans or protection measures developed in the future would apply. The regulations also incorporate elements from NEPA. NHPA and its implementing regulations require Federal agencies to consider the effects of their undertakings on historic properties. Protection of Historic and Cultural Properties, 36 CFR 800, outlines the set of procedures established by the NHPA that Federal agencies follow before implementing an action that may affect historic properties. The term historic properties refer to cultural properties as those that have been listed or determined eligible for the National Register of Historic Places (NRHP).

Methodology and Impact Analysis. The methodology includes two basic approaches of analyses. The first method included a cultural-historic resources study, prepared by Kumu Pono Associates (Maly and Maly 2006). This document references the ethnographical and historic uses of the region, and identifies several historic, ethnographic, and archaeological site types and features that may be found in the proposed project area. In the collection of native and historical accounts, Kumu Pono Associates notes that the lands of the Laupahoehoe forest region were frequently mentioned in several prominent traditions. Significantly, the importance of the Laupahoehoe region koa forests, mountain bird habitats, and the traditional trails which connected the lowlands with the mountain lands and neighboring districts, are frequently referenced in traditions and historical accounts.

The research conducted as a part of the study is consistent with Federal and State laws and guidelines for such studies. Among the pertinent laws and guidelines are the NHPA; the Advisory Council on Historic Preservation's "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (ACHP 1985); National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1990); the Hawaii State Historic Preservation Statue (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of on-going cultural significance; the criteria, standards, and guidelines currently utilized by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) for the evaluation and documentation of cultural sites (cf. Title 13, Sub-Title 13:275-8; 276:5 – 2003); and the November 1997 guidelines for cultural impact assessment studies, adopted by the Office of Environmental Quality Control (which also facilitate the standardized approach to compliance with Act 50 amending HRS Chapter 343; April 26, 2000) (Maly and Maly 2008).

As a part of research conducted over the last 10 years on the mountain lands of the Hilo and Hämākua region, the authors have investigated a wide range of archival-historical literature, referencing both native Hawaiian language and English texts; and conducted field visits and interviews with elder kama'āina (native and long-time residents) known to be knowledgeable about the history, residency, and land use on the 'āina mauna (mountain lands), of which the proposed Laupahoehoe HETF are a part. The narratives cited in this study provide readers with access to a rich and diverse collection of

cultural-historical accounts for these lands, situated on the ko‘olau (windward) side of the island of Hawaii (Maly and Maly 2008).

No cultural concerns or issues specific to the proposal were identified by the Kumu Pono Associates study. The project area was primarily used in a way that would not leave an archaeological record, such as harvesting trees or collecting flora and fauna. Other uses that have the potential to leave an archaeological record include, but are not limited to, well-worn and/or maintained trails, shrines or burials.

The second method included a records search and field inventory of the project area in an attempt to locate potential archaeological features or properties. The State Historic Preservation Department (SHPD) of Hawaii (Hilo Office) was consulted August 14, 2008, and November 17, 2008 (Donham 2008). Basic methodologies and professional credentials were reviewed.

A prefield review of the project area was conducted in the Hilo SHPD office on December 4, 2008, to determine whether previous studies or cultural and historic properties were known for the area. No previous archaeological studies had been conducted within the project area or surrounding vicinity. The cultural and historical research report by Kumu Pono Associates was discussed and determined to more than adequate to meet the Native Hawaiian organizations consultation requirements of 36 CFR part 800. A discussion of expected/potential resource or property types occurred (Donham 2008, *personal communication*). In addition, the SHPD provided TEAMS archaeologists with several copies of report formats and State of Hawaii guidelines.

Intensive archaeological surveys were conducted December 5–8, 2008. As a result of these investigations, one potentially historic property was identified at the low water crossing of Kapili Stream. This consisted of an approximately 15.5-foot high by approximately 51-foot wide semi-circular retaining wall. In further consultation with the Hilo SHPD (Donham 2008, *personal communication*), it was determined that the retaining wall was probably constructed during the 1970s, and is not considered historically significant. As a result, no cultural or historic properties were identified within the area. For a complete review of existing conditions, survey parameters, and species identified during the survey see the [Archaeological Assessment](#) and [Cultural-Historical Reports](#) (Maly and Maly 2006).

Determination of Effects. For all alternatives, no direct, indirect or cumulative impacts to historic or cultural properties would occur from any of the proposed actions due to the fact that no cultural or historical properties were identified. Incorporation of the mitigation measures would reduce impacts from project activities in the case inadvertent discoveries were made during project activities.

Conclusion: All alternatives are in compliance with laws, regulations, and policies associated with heritage and cultural resources. No impacts are expected because no historical or cultural properties were identified. Mitigation measures as outlined in Hawaii State Historic Preservation Statute (Chapter 6E), including those associated with findings during construction, and would further protect un-identified resources.

Socioeconomic Characteristics

Existing Condition. There are a few single family residences along the Manowaiopae Homestead Road. The nearest residence along the road to the proposed site is approximately 2 miles.

Determination of Effects and Conclusions. Increase in population as a result of one permanent residence and temporary overnight stays by research scientists as described in Alternatives 2–5 would not lead to significant shifts in demographic characteristics or demands on public services in the area.

Some increases in revenue to local business in the town of Laupahoehoe may occur as visitors may stop to shop. Some short-term employment opportunities could occur to residents of Hilo, and Hawaii County, for facility construction activities. No long-term local employment opportunities are expected from the construction of research and education center except for a caretaker.

Infrastructure

Roadway Access

Existing Condition. Access to the research and education center is along the Manowaiopae Homestead Road. Sections of this road are owned and maintained by county and private owners. Also see [Soils and Hydrology Report](#) and the Climate, Geology, Soils and Hydrology existing condition sections of this document.

Determination of Effects. It is expected that road usage will increase slightly from present use. All presently existing gates would remain in place and locked and would not be open to the general public. Anticipated uses from research activities would be linked with the type and scope of work being conducted and would likely vary over time. It is anticipated that research scientists accessing and using the research and education center would use road with a frequency of approximately one to two vehicles per day. Educational use in the form of field trips hosted by IPIF staff is anticipated to be one or two high clearance vans transporting visitors to the site occasionally on weekends and eventually reaching one educational visit per week.

Facility Costs

Existing Condition. During the scoping process, the economic feasibility of burial of electrical lines along the scenic view area was considered to be a significant issue brought forward in analysis. Design work for the facilities is not yet completed; however, initial estimates for costs are outlined in Table 4.

Table 4. Thirty Year Life Cycle Costs by Alternative for the Laupahoehoe Research and Educational Center Facility Including Road Improvements (Swienton 2009)

Alternative	30 Year Life Cycle Cost (\$)
Alternative 2 (green alternative): see Chapter 2 for complete description—powerlines buried along scenic viewplane	5,879,000
Alternative 3 (above ground powerline installation): same as Alternative 2, except all powerlines would be installed above ground	5,539,000
Alternative 4 (power from propane generator): same as Alternative 2, except no powerlines would be installed and power would be from propane	6,164,000
Alternative 5 (no wind generators): same as Alternative 2, except no wind generators installed	5,869,000

Determination of Effects and Conclusions. Based on these cost analysis, Alternative 3 is the least expensive because costs to install electrical lines is less expensive than burial of electrical lines as described in Alternatives 2 and 5. Alternative 5 is the next least expensive alternative which includes electrical line burial minus the installation of the wind generator. Alternative 5 is the preferred alternative due to potential effects to federally listed endangered species and the installation of a tower associated with Alternatives 2, 3 and 4. All alternatives fall within the estimated budget for the research and education center; therefore, none of the alternatives propose a significant impact.

Section 4. Cumulative Impacts

A cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7). Table 5 lists the past, present, and reasonably foreseeable future actions in and near the project area.

Conclusion. There are direct effects from implementing the alternatives for this project to wildlife and scenery and this section discusses the overall, or cumulative, effects. The spatial boundary for cumulative effects includes the road corridor and approximately ¼ mile around the 20 acre leased area the rationale for this boundary is based on a reasonable distance of scenic impacts to persons living near by and wildlife in and near the proposed facility site. The temporal boundary includes the projects listed in Table 5 and anticipated projects that may occur within the next 2 to 5 years. Although no cumulative impacts would occur from a scenic perspective from any of the alternatives, implementation of alternatives 2-4 have the potential to significantly impact federally listed species. Implementation of Alternative 5 would have no cumulative effects from these project activities.

Table 5. Past, present, and foreseeable future actions near the Laupahoehoe Research and Education Center Project Area

Agency or Ownership	Past and Ongoing Activities	Future Activities
Private	Biological inventories and invasive weed treatments along road corridor.	Invasive weed treatments along road corridor (Whitehead 2008)
State	Grazing within and around the proposed project area and for the past 30 years.	Continued grazing within 20-acre leased area and surrounding vicinity
State	Federally listed plant protection within the HETF adjacent to the project area including protection fencing, out-plantings, and seed and propagule collection. Invasive species weed control and outreach and educational trips also occur within the HETF.	Same as past and ongoing activities
USFWS	The Hakalau Forest National Wildlife Refuge is near the project area (southeast of the site) and adjacent to the HETF. USFWS frequently does restoration work using volunteers. Road access to their areas uses alternative routes than any roads evaluated in this project. Typical volunteer usage is approximately 10 to 12 people/weekend year-round (Glynn 2009).	Same as past and ongoing activities
USDA-FS	On-going research and management activities within the HETF as outlined in the Establishment Record and the State of Hawaii Permit to Use State Lands.	Installation of stream gauges in Kaiwilahilahi, the Haakoa, and Kaawalii Streams in the Laupahoehoe Unit at approximately 2,000 feet elevation. Installation of weather station adjacent to Blair Road at 3,500-4,000 feet elevation

Required Permits and Approvals

The following permits and approvals would be required:

- Section 404 permit dealing with the placement of road fill into the Kapili Stream must be obtained from the U.S. Army Corps of Engineers.
- State of Hawaii, Department of Health, National Pollutant Discharge Elimination System (NPDES) Permit
<http://hawaii.gov/health/environmental/water/cleanwater/wqsmaps/forms/index.html>
- County of Hawaii building permit(s).
- Informal consultation with USFWS and Determination of Not Likely to Adversely Affect (NLAA).
- Final Approval of Direct Lease from State of Hawaii, Department of Land and Natural Resources, Land Division to United States of America, Department of Agriculture of 20 acres, more or less, for Research, Educational, and Housing Facilities Purposes at Laupahoehoe, Hawaii, Tax Map Key: (3) 3-6-6:portion of 46.

Anticipated Determination

It is not expected that implementation of the environmentally preferred Alternative 5 would have a significant negative impact on the environments, and a finding of no significant impact (FONSI) is anticipated. Note: concurrence letters to USFWS and SHPD were submitted February 19, 2009.

Findings and Reasons

Chapter 11-200-12, Hawaii Administrative Rules, outlines those factors agencies must consider when determining whether an action has significant effects:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

For all alternatives, no direct, indirect, or cumulative impacts to historic or cultural properties would occur from any of the proposed actions due to the fact that no cultural or historical properties were identified. Incorporation of the mitigation measures would reduce impacts from project activities in the case inadvertent discoveries were made during project activities.

2) Curtails the range of beneficial uses of the environment.

The objectives of establishment of the HETF are to provide lands for conducting research that serves as bases for the restoration, conservation, and management of forests in Hawaii; in addition to providing education facilities for the general public and university and Forest Service staffs; and to serve as a site providing local, regional, and global long-term environmental monitoring data. Establishment of facilities as described in the preferred Alternative 5 near the HETF boundary would provide beneficial uses of the environment because it provides a platform for education in addition to facilities for research scientists conducting research nearby.

3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The preferred alternative action is consistent with the environmental policies established in Chapter 344, Hawaii Revised Statutes (HRS) and contributes to the conservation of threatened and endangered species, as covered by Chapter 195D, HRS. It is also consistent with Section 4 of the County of Hawaii General Plan (2005), which sets goals and policies for maintaining environmental quality. The action is consistent with goals and objectives of the Memorandum of Understanding between the State of Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife and the USDA Forest Service for the Establishment and Administration of the Hawaii Experimental Tropical Forests.” The development of the experimental forest would help achieve the stated objectives to provide an area to conduct research, demonstration, and education on management of tropical forests in the Pacific, and provide tools to restore and sustainably manage Hawaii's forest resources.

4) Substantially affects the economic or social welfare of the community or state.

The preferred alternative (Alternative 5) will not adversely affect the economic or social welfare of the community or state.

5) Substantially affects public health.

The preferred alternative (Alternative 5) is not anticipated to substantially affect public health. The proposed action may have a positive impact on public health by protecting native forest.

6) Involves substantial secondary impacts, such as population changes or effects on public facilities.

The preferred alternative (Alternative 5) is not anticipated to result in any substantial secondary impacts, such as population changes or effects on public facilities.

7) Involves a substantial degradation of environmental quality.

The preferred alternative (Alternative 5) would have minor impacts on the environment. Environmental quality is being regulated by permits to avoid environmental degradation and thus would not contribute to environmental degradation of environmental quality.

8) Is individually limited but cumulatively has considerable effect upon environment or involves a commitment for larger actions.

The research and education center is not related to other activities in the region in such a way as to produce adverse cumulative effects of involve a commitment of larger actions.

9) Substantially affects a rare, threatened or endangered species, or its habitat.

Although there are rare, threatened, or endangered species and habitats in and near the project area, implementation of mitigation measures associated with the preferred alternative would result in little or no impacts to wildlife or State listed species, and no adverse effects to federally listed species.

10) Detrimentially affects air or water quality or ambient noise levels.

The preferred alternative action will have no detrimental effects on air quality, water quality, or noise levels. The area is remote, and construction noise will be localized and temporary.

11) Affects to or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

Although the area proposed for the research and education center is located in an area with volcanic and seismic risk, the entire Island of Hawaii shares this risk. The preferred alternative is not imprudent to construct. No floodplains are involved.

12) Substantially affects scenic vistas and view planes identified in county or state plans or studies.

Although there are areas near the project that are considered scenic vistas, they are not visible from the project site. The project site is not noted for its natural beauty in the Hawaii County General Plan. Underground burial of electrical power lines along the scenic view accessing the research and education center in combination with management recommendations would reduce scenic impacts associated with the preferred alternative (Alternative 5) to local residents and visitors to the project area.

13) Requires substantial energy consumption.

Although construction of a research and education center will require the use of energy, no adverse effect to energy consumption would be expected with the preferred alternative (Alternative 5). Additionally, solar panels are proposed to provide supplemental energy source.

For the reasons above, the proposed action will not have any significant effect in the context of Chapter 343, Hawaii Revised Statutes and section 11-200-12 of the State Administrative Rules.

Laupahoehoe Research and Education Center Facility Construction Project ID Team Members

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Scott Reitz	<i>Wildlife</i>
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Charles Warren	<i>Roads</i>
Thomas Cole	<i>Geographic Information Systems</i>

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- Parker, P.L.; and T.F. King. 1990. Guidelines for Evaluation and Documenting Traditional Cultural Properties. *National Register Bulletin*, USDI-National Park Service <http://www.nps.gov/history/nr/publications/bulletins/nrb38/>
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USDI-USFWS. 2003. Service Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines. Memorandum, May 13, 2003. 57 p.

Whitehead N. 2008. Ecologist, Kamehameha Schools. Personal communication, October 10, 2008.

Appendix A: List of Agencies and Persons Consulted

Note: For a complete list of mailing addresses, see the project record.

Federal Agencies and Individuals Contacted

U.S. Department of Transportation, FHWA

U.S. Fish & Wildlife Service

U.S. Fish & Wildlife Service, Hakalau

U.S. Representative, N. Abercrombie

U.S. Representative, M. Hirono

U.S. Senate, D. Akaka

U.S. Senate, D. Inouye

USDA-Natural Resources Conservation Service, L. Yamamoto

USDA-Natural Resources Conservation Service, D.Clausnitzer

USGS-PIERC, P. Banko

USGS-BRD, J. Jacobi

State Agencies and Individuals Contacted

Hawaii Island Burial Council c/o DLNR, State Historic Preservation Division

Department of Agriculture

Land Use Commission Department of Business, Economic Development & Tourism

Office of Planning, Department of Business, Economic Development & Tourism

Department of Defense

Department of Education, Hilo District

Department of Hawaiian Home Lands

Department of Health

Department of Transportation

Department of Transportation, Highways Division

Department of Hawaiian Homelands, L. Chinn

Department of Hawaiian Homelands

DLNR, Division of Aquatic Resources

DLNR, Division of Conservation and Resources Enforcement

DLNR, Division of Forestry & Wildlife

DLNR, Land Division

DLNR, Office of Conservation and Coastal Lands

Hawaii Island Office

DLNR, State Historic Preservation Division

DLNR, State Parks

DOFAW, N. Agorastos, C. Clement, I. Cole, P. Conry, R. Hauff, I. Kawashima, R. Kennedy, C. Ogura

Hawaii Natural Heritage Program

Natural Area Reserve Commission

Office of Environmental Quality Control

State House, J.Chang

State House, D. Takamine

State of HI, L. Lingle

State Senate, L. Inouye

State of Hawaii, S.Whalen

State of Hawaii, R. Ishisaka

State of Hawaii, J. Aiona, Lt. Governor

County Agencies and Individuals Contacted

Hawaii County Native Hawaiian Chamber of Commerce

Hawaii County Department of Parks and Recreation, P. Engelhart

C. Yuen

D. Yagong

P. Hoffman

M. Hopkins

B. McClure

H. Kim

L. Mahuna

D. Oliviera

University of Hawaii

L. Hallacher

K. Silva

S. Nagata

S. Ziegler-Chong

D. Lovell

J.B. Friday

S. Miyasaka

Other University and Colleges

L. Brezinsky, Hawaii Community College

G. Asner, Stanford University

P. Vitousek, Stanford University

Public Utilities

Hawaiian Electric Light Company (HELCO)

Associations/Businesses/Clubs/Other

Big Island Gun Club

Hawaii Forest Industry Association

Edith Kanaka'ole Foundation

Forest Solutions

Hawaii Audubon Society

Hawaii Conservation Association

Hawaii Forest Industry Association

Hawaii Hunting Advisory Council

Hawaii Island Economic Development Board

Hawaiian Civic Club of Hilo

Kamehameha Schools

Kamehameha Schools

Kumu Pono Associates

Big Island Invasive Species Council (BIISC)

CGAPS

Parker Ranch

Parker Ranch Hunt Club

Pig Hunters of Hawaii

50's Highway Fountain Café

Sierra Club, Moku Loa Group

The Nature Conservancy

TREE Center Hawaii

Hilo Bay Watershed Advisory Group

Private Landowner/Lessee/Community Member

Big Island Gun Club, J. O'keefe

Hawaii Forest Industry Association, H. Gallo

Edith Kanaka'ole Foundation, K. Kanahale-Frias

Forest Solutions, G. Cellier

Hawaii Audubon Society

Hawaii Conservation Association, D. Spooner

Hawaii Forest Industry Association, M. Robinson

Hawaii Hunting Advisory Council, S. Araujo

Hawaii Island Economic Development Board

Hawaiian Civic Club of Hilo

Kamehameha Schools, P. Simmons

Kamehameha Schools, B. Rosehill

Kumu Pono Associates, K. Maly

Big Island Invasive Species Council (BIISC), J. Leialoha

CGAPS, C. Martin

Parker Ranch, B. Beaudet

Parker Ranch Hunt Club, R. Hoeflinger

Pig Hunters of Hawaii, T. Medeiros, Sr.

50's Highway Fountain Café, C. Ignacio

Sierra Club, Moku Loa Group

TNC, S. Case

TNC, M. Fox

TNC, R. Shallenberger

TREE Center Hawaii, C. Schumann

Hilo Bay Watershed Advisory Group

Appendix B: Public Comments Received During Scoping

Note: Comment forms begin on the following page.

Laupahoehoe Research and Education Center Construction Project
Public Meeting, Sept 10, 2008
Public Comment Form

The Institute of Pacific Islands Forestry (IPIF) is proposing to construct a research and education center for the Laupahoehoe unit of the Hawaii Experimental Tropical Forest. The facilities will consist of road improvements for safety, buildings for lodging, education activities, meetings, research work and storage, paths and walkways, driveways and covered parking, utilities, fencing, and water catchments. Power could be provided by electric service from local utility, photovoltaic panels and storage, propane generators and/or wind turbines. Access to the site is on existing public and private roads that will be improved for safety as part of this project.

IPIF needs your assistance and input about the project.

Please tell us what you think about:

- Research & Education Center:

- Very interested in linking local students to natural environment.

- See a great benefit to exposing students to higher education.

- Power source for the facilities

- Road improvements

- Access must be safe for student transportation.

Additional comments

Your name Thomas Ekno Date 9/10/08

Mailing Address Laupahoehoe High + Elem. School

Telephone (optional) 962-2200

E-mail (optional) Thomas.Ekno@notes.k12.hi.us

check here if you would like a copy of the EA sent to your address when it is completed.

check here if you did not already receive a letter from us and would like to be included in future mailings

Laupahoehoe Research and Education Center Construction Project
Public Meeting, Sept 10, 2008
Public Comment Form

The Institute of Pacific Islands Forestry (IPIF) is proposing to construct a research and education center for the Laupahoehoe unit of the Hawaii Experimental Tropical Forest. The facilities will consist of road improvements for safety, buildings for lodging, education activities, meetings, research work and storage, paths and walkways, driveways and covered parking, utilities, fencing, and water catchments. Power could be provided by electric service from local utility, photovoltaic panels and storage, propane generators and/or wind turbines. Access to the site is on existing public and private roads that will be improved for safety as part of this project.

IPIF needs your assistance and input about the project.

Please tell us what you think about:

- Research & Education Center:

GREAT Project!
look forward to volunteering
on occasions.

- Power source for the facilities

Please Review Benefits of Using
on site - Renewable (solar/wind)
energy sources - (even to fuel
preference if cross!)

- Road improvements

Additional comments

Need Management Protocols to prevent
accidental introductions of exotic frogs
& other invasive species. Need a response
caretake on site at night?

Your name Bob Curbertson Date 9/10/08

Mailing Address POB 169 DAWUNO, HI 96776

Telephone (optional) _____

E-mail (optional) _____

check here if you would like a copy of the EA sent to your address when it is completed.

check here if you did not already receive a letter from us and would like to be included in future mailings

Laupahoehoe Research and Education Center Construction Project
Public Meeting, Sept 10, 2008
Public Comment Form

The Institute of Pacific Islands Forestry (IPIF) is proposing to construct a research and education center for the Laupahoehoe unit of the Hawaii Experimental Tropical Forest. The facilities will consist of road improvements for safety, buildings for lodging, education activities, meetings, research work and storage, paths and walkways, driveways and covered parking, utilities, fencing, and water catchments. Power could be provided by electric service from local utility, photovoltaic panels and storage, propane generators and/or wind turbines. Access to the site is on existing public and private roads that will be improved for safety as part of this project.

IPIF needs your assistance and input about the project.

Please tell us what you think about:

- Research & Education Center:

I support the education and research center and want us to leave a light footprint on the environment.

Power source for the facilities

I am strongly in favor of alternative energy as a power source. Would you be willing to consult with local solar contractors for cost and infrastructure estimates?

- Road improvements

The low water area by 6 ton bridge has been a local swimming hole for years. Is it possible to save the swimming hole and make the road safer?

Additional comments

Your name Kimball Dougherty Date 9/16/08

Mailing Address P.O. Box 243

Telephone (optional) 936-9662

E-mail (optional) doughertykim@hotmail.com

check here if you would like a copy of the EA sent to your address when it is completed.

check here if you did not already receive a letter from us and would like to be included in future mailings

TELEPHONE CONSULTATION		LAUPAHOEHOE FACILITY CONSTRUCTION		COMMENT NUMBER
DATE 08/20/2008	TIME 2:45	<input checked="" type="checkbox"/> INCOMING	RETURNING CALL	
		URGENT	CALL BACK	
NAME EVELYN HAKAMA	RECEIVED BY		MARTI DODDS	
(ADDRESS) P.O. BOX 56, KAMUELA, HI 967343 (PHONE.) NOT LEFT		CONTACT POINT	SCOPING LETTER	DATE 08/20/08
PRIMARY CONCERN	LOCATION OF FACILITIES			
COMMENTS				
<p>MS. HAKAMA NEEDED AN EXPLANATION FOR LOCATION OF THE FACILITIES – UPON ORIENTATION SHE SAID SHE HAD NO OBJECTION. HOWEVER, SHE DOESN'T WANT TO HAVE POWER POLES ON HER PROPERTY, BUT SEEMED RELIEVED OF GREAT CONCERN WHEN I TOLD HER SHE DID NOT HAVE TO USE THE SERVICE, OR PAY FOR THE INSTALLATION. IT IS HER INTENTION TO USE ONLY ALTERNATIVE POWER.</p> <p>SHE IS INTERESTED IN RETIRING TO THE PROPERTY AND TEACHING HER GRANDSON ABOUT SUBSISTENCE FARMING AS DONE IN HISTORIC HAWAII. SHE WAS RAISED IN KAMUELA, THE DAUGHTER OF A PANIOLO FOR PARKER RANCH.</p> <p>SHE SAYS THE EXISTING ROAD WE HAVE ON THE MAP IS ON HER LAND ACCORDING TO SURVEY DONE AT THE TIME OF PURCHASE IN 1999.</p> <p>SHE DID NOT KNOW THAT KAMEHAMEHA SCHOOLS OWNED PROPERTY ON BOTH SIDES OF HER.</p>				
RESPONSE – SHE EXPECTS TO ATTEND THE MEETING ON THE 10 TH , IF NOT SHE WILL SEND IN WRITTEN COMMENTS – SHE SAYS SHE HAS NO COMPUTER OR ACCESS TO INTERNET.				
NOTE THE ISSUE OF LOCATION OF THE ROAD VS. THIS AND OTHE PROPERTY SHOULD BE FOLLOWED UP WITH THE COUNTY.				
SIGNED		OTHERS INFORMED		
DATE 08/20/2008				

TELEPHONE CONSULTATION		LAUPAHOEHOE FACILITY CONSTRUCTION		COMMENT NUMBER
DATE 8/26/2008	TIME 11:40	<input checked="" type="checkbox"/> INCOMING	RETURNING CALL	
		URGENT	CALL BACK	
NAME: ROBERT PATEY		RECEIVED BY	MARTI DODDS	
(ADDRESS) 68 KEOKEA, HILO HI 96720		CONTACT POINT		
(PHONE.) 987-6330		Hilo Office		
PRIMARY CONCERN: DEVELOPMENT				
COMMENTS				
<ul style="list-style-type: none"> • Very concerned about power poles - they would be right in the scenic view of the ocean from his property – the road is the west boundary– says if there is concern about his rights the electric lines would be underground • Concerned about road improvements – does not want more traffic • Would prefer that another route be used to access the forest – anywhere but here • He is not for the proposal at all – does not want the road improved – keep things the way they are !!! • The road abuts 3 sides of his property – the culvert / drainage improvements would be at the SW corner of his property • He spent \$400,000 on a property to build his quiet retirement home and does not want traffic, poles or road improvements • Mr. Patey spoke at length about the development of a school in his neighborhood in Hilo which is a problem with traffic, congestion, and noise – not a connected event, but clearly influencing his opinions 				
<p>Response – Encouraged him to attend the public meeting to get more information – he said he will probably attend but is resentful that the proposal is taking his time and gas to go to a meeting. Suggested he go to the web page for more information.</p>				
<p>Additional Follow-Up: Date:</p>				
SIGNED - /s/ MARTI DODDS		DISTRIBUTION: FILE & FTP FOLDER:		

Email to HETF inbox dated 9/08/2008

From: BSummers@its.jnj.com

Action Taken: Sent acknowledgement & forwarded email to Marti Dodds for follow-up on 9/9/08

Brian:

My wife and I own a piece of property that will be affected by the proposed changes and wanted to reach out to you to first let you know who we are and to also ask a few questions. Our property TMK is #336003031 which puts us in Manowaiopae homesteads very close to the "Drainage Structure repair" identifier on the attachment 2 map. We are pleased to have HETF as neighbors and interested in finding out more about the proposed road changes and bridge repair near our property since the current road runs through our property. Could you send me more information as it becomes available on how wide the road will be and the extent of the drainage structure repair. The current drainage structure is very difficult to traverse with a vehicle. Are you proposing to make a bridge? We also would like to find out more about how much traffic will be using the road when the project is completed.

Thank you for your time,

Robert Summers

Email to HETF inbox dated 9/10/08

From: David.Clausnitzer@hi.usda.gov

CC: Anthony Ingersoll

Action taken: none

Hi Boone,

Thank you for your invitation to provide comments about the planning of the Laupahoehoe HETF research and education center.

I support the construction of a center of the proposed areal extent and at the proposed site. This site provides convenient access without being situated on prime native forest. It is also the best site for a vehicle cleaning/inspecting waystation for vehicles travelling through weed-infested makai areas before they enter the experimental forest itself.

David

Summary of Questions and Concerns Taken by IPIF Staff at Public Meeting Held At Laupahoehoe High School, September 10, 2008

How will students get there? Schools don't have 4WD vehicles.

Will the building be ADA compliant?

How will this affect hunting? Will there be fencing?

Concerned about the amount of traffic. How much is anticipated?

Why do we need to construct a culvert if this is to be limited access?

Concern about power – distance is at least 2 mi from last pole.

Economic point of view – this would cost a lot. Wouldn't a self-contained power station be more effective? Was the future price of energy considered?

Aesthetic point of view – power lines blight on scenery.

Suggestion for power- 150KW solar for same amount of energy could be obtained.

How much electricity is actually needed? Couldn't alternatives to powerlines be used?

Concern about 6-ton bridge – a cement truck can't cross it.

What kind (if any) of maintenance will be done to the road?

Student safety concern – will road/facility be adequate? What about access to emergency care?

Program seems very broad, lots of goals were stated. How can all of these possibly be accomplished? Seems unattainable – we should focus on specific goals.

What is the budget for this project?

What about invasive species – such as coqui? Trucking, construction, etc. – do we have protocols in place?

Will the caretaker be on site 24 hours? What happens at night?

Can public have access to the engineering reports on the power, the culvert, and the road diversion?

Is a management plan available to review?

Will there be jobs created for the local community?

What about nighttime lighting? How much will this interfere?

Figure 1. Project Location Map

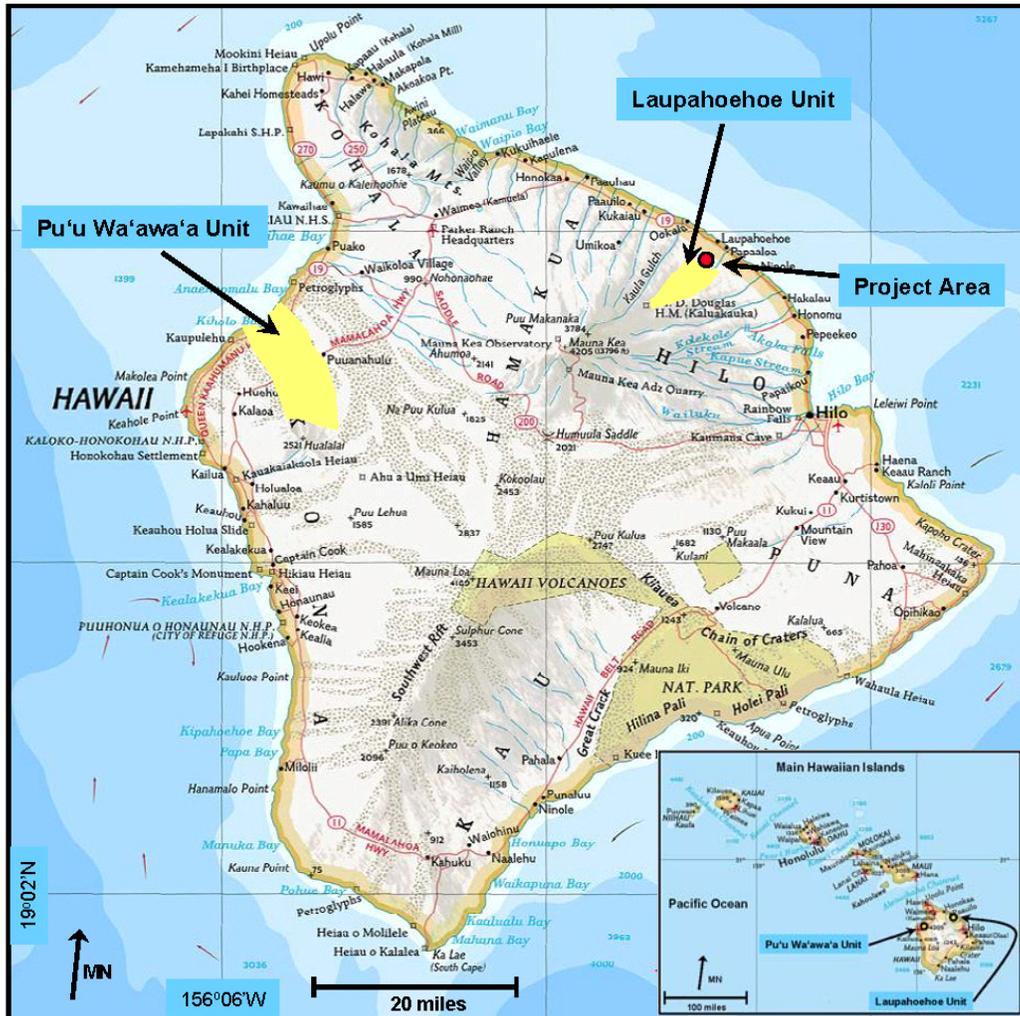


Figure 2. Project Location Topographic Map

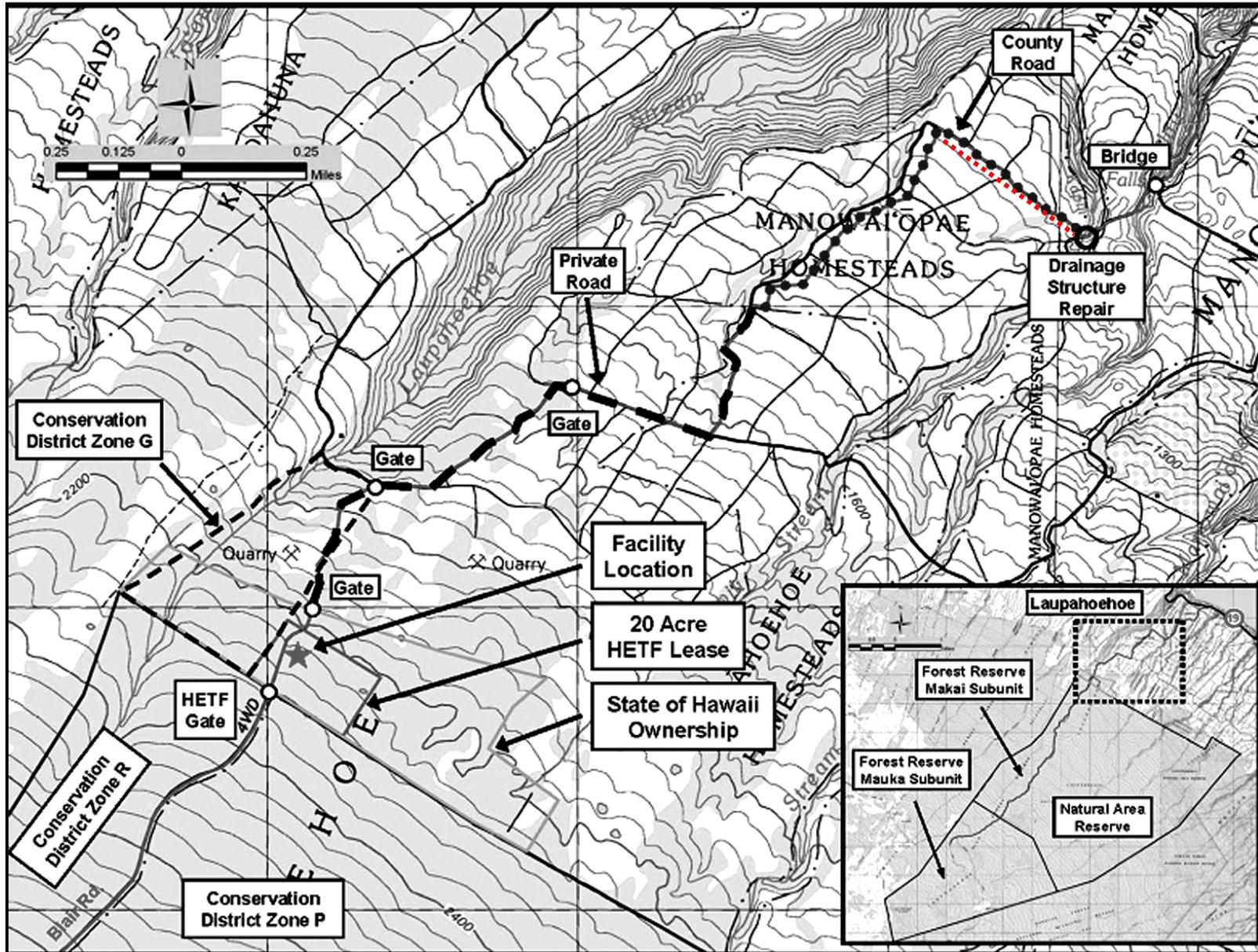


Figure 3. Project Location TMK Map

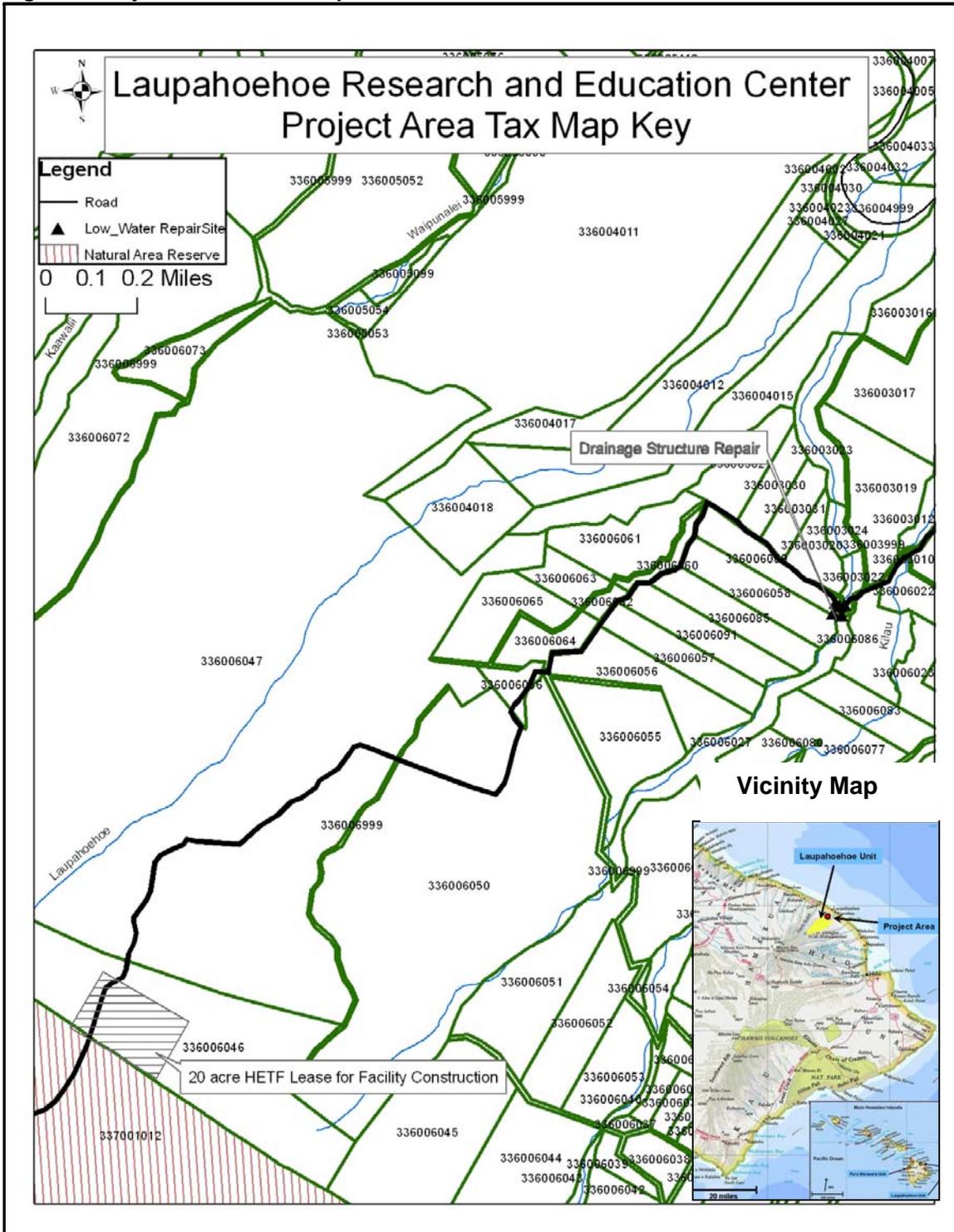


Figure 4. Project Location Survey Map

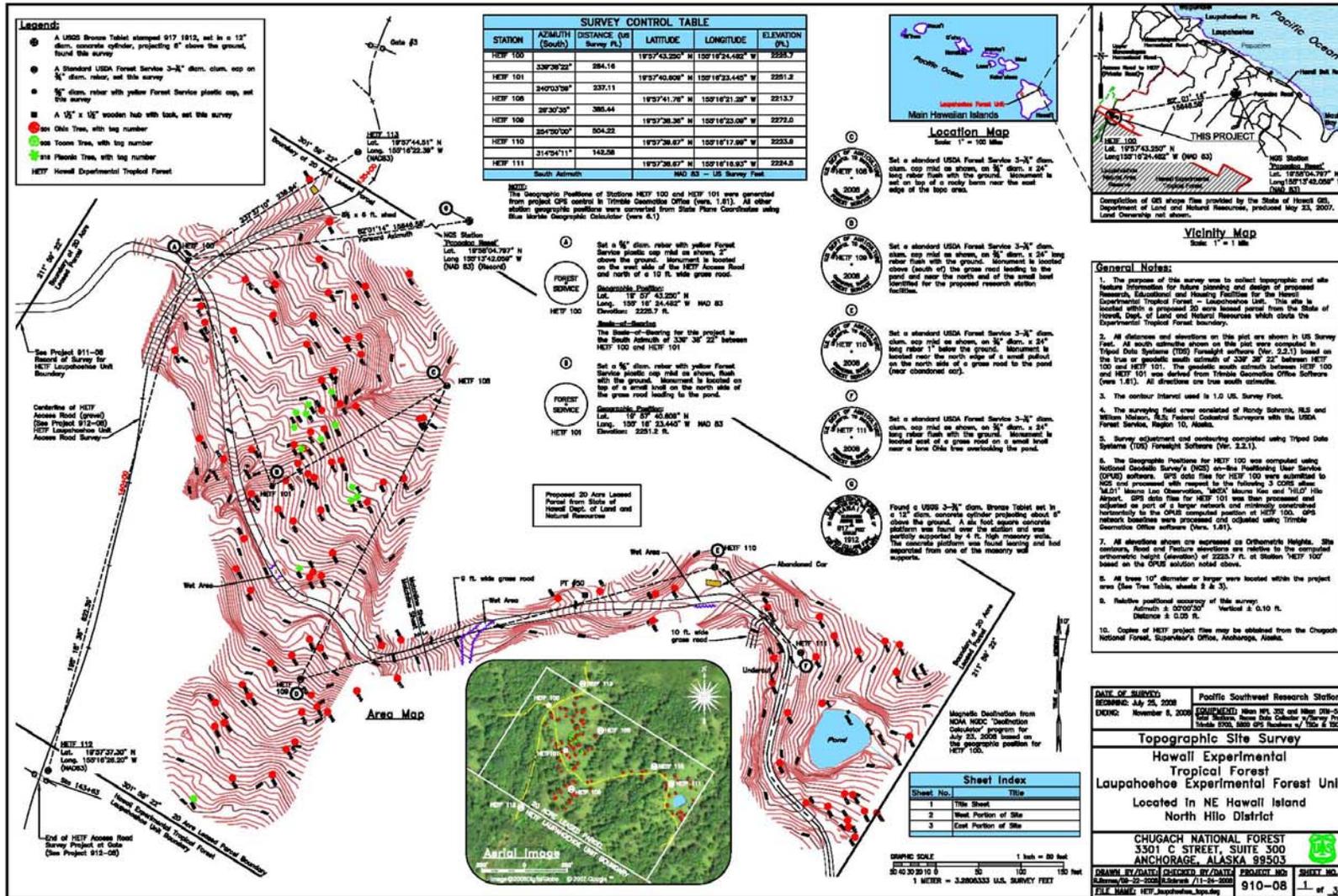


Figure 5. Site Photos of Facility Foot Print Location and Drainage Structure, Low Water Crossing



Figure 6. Site Photos of Road Re-alignment Area



Figure 7. Electrical Line Burial Location Map

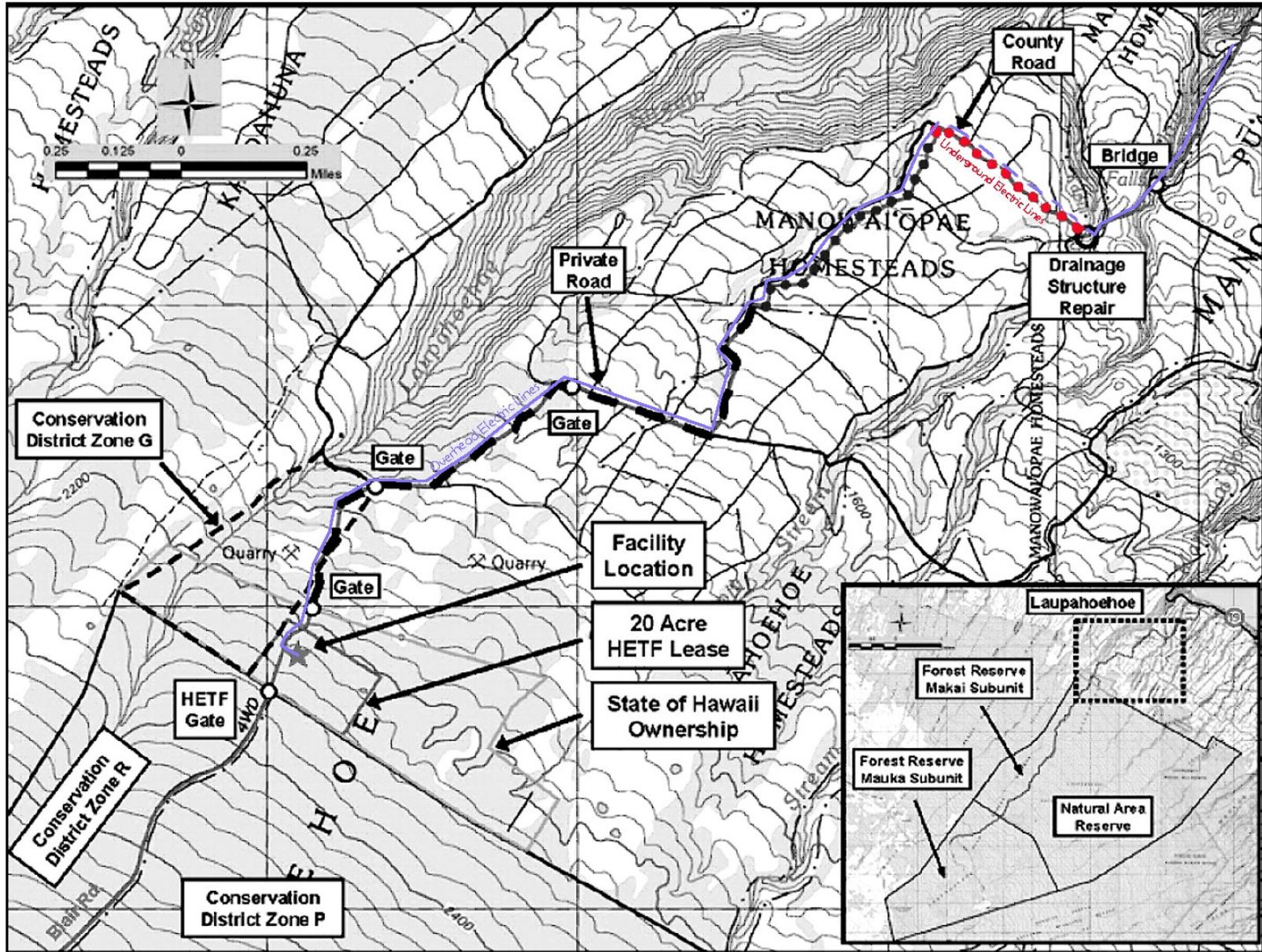


Figure 8. Site Photos of Scenic View and Road Corridor



Pacific Southwest Research Station- Institute of Pacific Islands Forestry- Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project

Watershed and Soils Report

Prepared by:

Chad Hermandorfer
Hydrologist
TEAMS Planning Enterprise Unit

March 2, 2009

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Introduction

Facility construction at the Laupahoehoe Wet Forest Unit of the Hawai'i Experimental Tropical Forest is to occur to support the 1992 Hawaii Tropical Forest Recovery Act. This will require construction of housing and research facilities, parking areas, power lines and upgrades to current road infrastructure and stream crossing structures. A site visit was made to the Laupahoehoe Unit on October 17, 2008 by TEAMS Hydrologist Chad Hermandorfer to determine the potential soil and water effects caused by this proposed project.

Proposed Action

The proposed action includes the following activities for facility construction:

- Two to three housing units (20 person sleeping quarter capacity) with centralized facilities, one caretakers living unit, one administrative unit with teaching and meeting rooms, utility storage buildings, rooftop water collection systems, permanent vehicle wash stations and a parking area (20 vehicle capacity). The parking area may serve as a helipad site, or may be constructed within the facility footprint depending on site design. Infrastructure development associated with construction would include trenching at specific locations within the facility footprint for electrical, propane for cooking, and septic systems. Depths of trenching will comply with all state and county regulations. The foot print of these facilities is approximately 1.5 to 3.0 acres.
- Fencing for security and cattle/wild ungulate exclusion would be installed around the 1.5 to 3.0 acre facility site. Preparation of the fence corridor will involve trimming of vegetation with hand operated tools (i.e., handsaw, machete, weed eater, chainsaw) from a 6 foot (ft) wide corridor. A 4 to 6 foot high fence would be constructed using hog wire or chain link fence supported by wooden or steel fence posts. The top wire of the fence will be smooth to reduce any chances of injury to birds or bats. To ensure exclusion of wild ungulates some barbed wire fence may be used and fencing mesh size may be more tightly woven closer to the ground and buried to exclude non-native predators. The fence would avoid any major geological, rare biological, terrestrial, or archeological/cultural features as determined by the archeological and biological surveys.
- All efforts in facility design would preserve existing native *Ohia* and *Pisonia* trees. No more than 5% of native trees within the footprint area are expected to be necessary for removal for facility construction and safety concerns. Revegetation with native plants would occur in areas disturbed by construction activities within the facility footprint. Small native plant demonstration gardens for educational purposes may also be constructed and located within the facility complex footprint.
- Although wind and solar energy sources alone cannot supply power necessary for the proposed center, installation of solar panels and wind generators would provide supplemental green energy for these facilities. One wind generator with a maximum height of 120 feet would be located near the center in an area that maximizes wind-power generation and is at least 100 feet away from existing trees. Solar panels as supplemental power would be located either on rooftops of facilities or on free standing posts nearby. All installations of alternative energy sources would comply with all county building and zoning codes (<http://www.co.hawaii.hi.us/countycode/chapter25.pdf>)

- Alternative energy power sources would be installed to supplement energy needs for facilities. Wind and solar alone cannot supply all power necessary for the proposed facilities, however, wind generators and solar panels would be placed near or on facility structures to supplement energy needs and reduce usage from other power sources. All installations of alternative energy sources would comply with all county building and zoning codes (<http://www.co.hawaii.hi.us/countycode/chapter25.pdf>)
- Limited road improvements such as grading to smooth out rough areas, and resurfacing in some areas would occur along the Manowaiopae Homestead Road. No road widening beyond the existing road template will or major resurfacing would occur except for the road repair at the Kapili stream crossing. A minor road realignment at the Kapili stream crossing would provide safer passage during high water events and eliminate other safety concerns related to existing road undercut. A 12+/- foot shift of the roadway from the center of the Kapili steam road crossing and for the next 25 feet (traveling up the road) will improve the horizontal curve and also move away from the under cut. The elevation of the road may change slightly but will match the stream on the high side maintaining the same flow capacity. The existing crossing will remain intact where it is not undercut, however traffic will be diverted away from existing road undercut. Water depth indicators will be placed on each side of the stream crossing to alert vehicle drivers of water depth in the event of a large storm event.

Issues

An issue is a point of disagreement, debate, or dispute with a proposed action based on some anticipated effect. Forest Service personnel receive public comments and categorize them into significant or non-significant issues. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..."

Significant issues are those with a clear direct or indirect causal relationship from implementing the proposed action. Non-significant issues are identified as those (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence.

After both internal and external scoping was completed, it was determined that no significant or non-significant issues exist for this project in terms of the soil and watershed resources. Therefore, this analysis was conducted to see if the Project follows laws set up to protect soil and watershed resources either by the County of Hawaii, State of Hawaii or the United States Government.

Alternatives

The following paragraphs describe the Alternatives for the LHH project including the Proposed Action and the No Action Alternative.

Alternative 1 (No Action)

Under the No Action alternative, no ground disturbing activities, facility construction or minor road improvements would occur. Research activities associated with the HETF would continue to occur requiring research scientists to travel to HETF on a more frequent basis from Hilo or other places of residence to conduct research. Educational program scope would be reduced due to the absence of teaching rooms and facilities. Grazing activity would continue to occur on the site.

Alternative 2 (Proposed Action-Green Alternative)

See Proposed Action page 1

Alternative 3 (Overhead Electrical Powerline and Green Energy)

Same as the proposed action alternative (Alternative 2) except power to the facilities would be above ground. The power line would run parallel to the Manowaiopae Homestead road within the road right-of way. Alternative 3 evaluates the scenic impact from the installation of overhead electrical power lines and costs associated with installation of above ground power.

Alternative 4 (Propane Generation and Green Energy)

Same as the proposed action alternative (Alternative 2) except all power for the facilities would be generated by an onsite propane generation system. No extension of power lines from existing service would occur. Some above ground electrical lines within the facility footprint (1.5 to 3 acre site) may occur at specific areas to provide service. Alternative 4 evaluates the scenic impact and costs of power generation for the facility.

Alternative 5 (Buried Electrical Power Line and Green Energy from Solar Only)

Same as the proposed action alternative (Alternative 2) except wind turbines would not be installed. Alternative 5 addresses impacts to the federally listed species.

Existing Resource Conditions

Watershed and Water Quality

General Overview: Within the LHH Project area (as described in the EA), there are 3 watersheds where project activity would occur. These are the Kilau Stream watershed, the Kapili Stream watershed, and the Lapahoehoe Stream watershed. The 2006 State of Hawaii Water Quality Monitoring and Assessment Report (Hawaii State Department of Health, Environmental Planning Office 2008) was consulted to see if any of the project area streams are impaired based on the State of Hawaii water quality criteria. The report shows that all of the project area streams are meeting the water quality standards set forth by the State of Hawaii.

Laws to be followed: The Hawaii Experimental Tropical Forest Laupahoehoe Facility Construction Project must meet the standards set forth in the Clean Water Act. The Clean Water Act of 1977 was created to restore and maintain the chemical, physical and biological integrity of the Nation's waters. (Section 101(a)). It also regulates discharge of dredged or fill material into navigable waters (waters of the U.S.) (Section 404).

Soils

General Overview: The dominant soil type within the 1.5 to 3 acre project footprint site where the research and education center facility will be constructed is the Kiloa Extremely Stony Muck, 6 to 20 percent slopes Map Unit. The map unit symbol is: rKXD.

The following information for the rKXD soil comes from the Natural Resources Conservation Service (NRCS) website <http://soildatamart.nrcs.usda.gov/>

Description Category: S05

The Kiloa series consists of well drained, thin, extremely stony organic soils over fragmental 'A 'a lava. The surface layer is very dark brown extremely stony muck about 10 inches thick. It is underlain by fragmental 'A 'a lava. They are on uplands at an elevation ranging from 1,000 to 4,000 feet. They receive 90 to 150 inches of rainfall annually. Their mean annual temperature is between 64 and 67 degrees F.

Description Category: S01

This is a well drained, extremely stony organic soil that is shallow to fragmental 'A 'a lava, but deep to underling bedrock. It occurs on moderately sloping to moderately steep uplands. Slightly weathered ash and cinders are in the voids of the lava. The soil is strongly acid. Permeability is rapid, runoff is very slow, and the erosion hazard is slight.

Other pertinent facts about the Kiloa Extremely Stony Muck soil include:

- No ponding or flooding concerns
- It is recommended that small buildings not be built on slopes greater than 8%
- Greater than 50% of the soil has rock fragments greater than 3" in size.
- Not ideal for septic tank construction.
- The large rocks do not make this an ideal building site.
- 127 cm to bedrock

Kapali Stream Crossing

General Overview: As stated in the Proposed Action, minor road realignment (12+/- foot) at the Kapili stream crossing would occur to provide safer vehicle passage during high water events and eliminate other safety concerns related to the existing road undercut shown in Figure 1.



Figure 1. Existing stream crossing at the Kapili Stream. Notice the actively eroding undercut just right of center in the photo.

The Kapili stream is a 5-10 foot wide intermittent stream channel consisting of a boulder and cobble substrate (Figure 2). The vegetation in and around the stream and at the stream crossing site consists primarily of Sugarcane, Hilo grass, Vasey grass, and Glenwood grass. In checking the USGS Real Time Water Data for Hawaii website (<http://waterdata.usgs.gov/hi/nwis/rt>), no past flow data exists for the Kapili Stream. From eyewitness accounts, it should be noted that the stream is known to be flashy. Flows approaching 6-10 feet above channel bottom elevation have been seen (IPIF Staff, 2008). The stability of the channel bodes well for the proposed work that is planned for the site.



Figure 2. Typical substrate found within the Kapili Stream. Notice the predominance of cobbles and boulders.

Laws to be followed: The U.S. Army Corps of Engineers regulates the discharge of fill material into the waters of the United States. The Corps derives its authority from the two Federal laws that are central to the Corps regulatory program. Section 10 of the Rivers and Harbors Act of 1899 applies to all navigable waters of the United States and Section 404 of the Clean Water Act applies to all waters including wetlands that have sufficient nexus to interstate commerce. Waters of the United States include essentially all surface waters such as all navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters.

Due to the fact that the Kapili stream is not a navigable waterway, only Section 404 applies to the LHH Project. The following is a description of when a Section 404 permit is needed (<http://www.poh.usace.army.mil/EC-R/EC-R.htm>)

Clean Water Act – Section 404

Section 404 of the Clean Water Act requires approval prior to discharging dredged or fill material into the waters of the United States in dealing with any of the following:

- **Deposition (placement) of fill or dredged material in waters of the U.S. or adjacent wetlands.**
- **Site-development fill for residential, commercial, or recreational developments.**
- **Construction of revetments, groins, breakwaters, levees, dams, dikes, and weirs.**
- **Placement of riprap and road fills.**

In the case of the Kapili stream crossing site, road fill will be placed directly in the stream channel, thus triggering the need for a Section 404 permit from the Corps. This must be completed prior to project implementation.

Floodplains and Wetlands

Laws to be followed: There are 2 executive orders that must be addressed in regards to floodplains and wetlands. They are as follows:

- Executive Order 11990, 1977; (Wetlands Management) requires federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. To comply with Executive Order 11990, the federal agency would coordinate with the ACOE, under Section 404 of the Clean Water Act, and mitigate for impacts to wetland habitats.
- Executive Order 11988, 1977 (Floodplain Management) requires all federal agencies to take actions to reduce the risk of flood loss, restore and preserve the natural and beneficial values in floodplains, and minimize the impacts of floods on human safety, health, and welfare.

Field reconnaissance of the project foot print site in October 2008 as well as the LHH project area did not locate any existing wetlands, riparian, or hydric vegetation. Further, there are no ponding or flooding concerns associated with project area soils. Therefore, Executive Order 11990 would be followed.

There will be minor impacts to the stream channel/floodplain at the Kapili Stream Crossing. The channel would be excavated upstream of the current crossing approximately 12 feet. This equates to a disturbance site of approximately 0.01 acres. Excavation would occur so that pavement could be placed to match the current stream gradient at the site. The flow capacity of the stream would not be compromised with this activity. The channel roughness would be changed at this site, but 12-15 feet of stream channel is so minor that it would not be detectable at a watershed scale. For these reasons, Executive Order 11998 would be followed.

Existing Roads

General Overview: The Manowaiopae Homestead Road is the only access route into the proposed LHH facilities site. The road is maintained by the County of Hawaii and other private landowners who reside in the area. The road is paved in the lower portions before becoming a mixture of pavement and gravel shortly above the Kapili Stream Crossing. The road is approximately 10-12 feet wide supporting regular 4 wheel drive high clearance vehicles. From a hydrological perspective, the road showed little to no areas of rill or gully erosion. There are areas with past evidence of minor sheet erosion but, overall, the road base was stable and drainage structures were functioning.

Proposed Facilities Site

General Overview: The facilities for the LHH research station are to be constructed within a 1.5 to 3 acre parcel of land. The northern area of the parcel is shown in Figure 3. According to the professional survey conducted by the U.S. Forest Service, the parcel has slopes between 5-15%. Slope stability for the site is not an issue and drainage at the site is rapid with no evidence of standing water or wetland vegetation. According to NRCS soils information, the site is not ideal for a septic system. The rocky soils would not leave enough time for effluent to properly filter through the soil profile.

On January 21, 2009 TEAMS Hydrologist Chad Hermandorfer talked with the County of Hawaii, Department of Water Supply, Engineering Department about the intention to use a rooftop rainwater catchment as the water supply for the facilities. There is no need to file for a water right if a rooftop rainwater catchment is used in the County of Hawaii.



Figure 3. Photo of proposed Laupahoehoe Facilities Construction Site.

Laws to be followed: All proposed construction sites over 1 acre in size are required by law to obtain a National Pollutant Discharge Elimination System (NPDES) Permit. There are two types of permits associated with NPDES, general or individual, that may be necessary. In the case of the LHH site, an individual permit is necessary due to the fact that the activity will disturb over 1 acre and will take place on lands owned by the State of Hawaii. Information on the NPDES

Program as well as copies of the individual permit application can be found at <http://hawaii.gov/health/environmental/water/cleanwater/index.html>.

Effects Discussion

Implementation of the No Action Alternative would keep existing soil and water resource conditions static. There would be no disturbance to the stream channel and floodplain at the Kapili stream crossing site. Further, no road maintenance would occur to the Manowaiopae Homestead Road and no disturbance would occur at the LHH project foot print site.

Regardless of which action alternative is selected, soil and watershed effects would be the same.

Water Quality: Water quality concerns exist at the Kapili Stream Crossing and the facilities construction site. There is the potential for a flush of sediment during construction of the low water crossing at the Kapili stream. This potential exists if construction is started and, then, interrupted by heavy rainfall that would produce a significant flow in the channel. It is recommended that the construction take place when heavy rains and streamflow is not likely. The work should not take place when the stream is flowing. This would reduce the risk of sedimentation to the Kapili stream and protect water quality downstream.

Proper installation of the septic system at the LHH facilities site is important. According to the NRCS soils database, the Kiloa Extremely Stony Muck soil is not ideal for septic system placement due to the rapid drainage of the soil. A leech bed site must be selected where proper filtration of the effluent can occur. If this is not achievable, mitigations or alternatives may be necessary. Guidance from the County of Hawaii Health Department or the NRCS may be warranted.

Construction activities for the LHH facilities should not impact water quality in terms of sediment. The closest stream drainages are approximately ¼ mile from the LHH project foot print site. Silt fencing is recommended around the construction site during construction and until the site has revegetated, but whatever sediment does leave would be filtered out before reaching project area stream channels.

Road maintenance activities would be a positive in terms of water quality. Improvements to road drainage on the Manowaiopae Homestead Road would reduce the already minor sediment yield entering project area streams from the road.

Trenching for power lines would not cross any streams and therefore would not be a concern in terms of erosion and subsequent sedimentation to project area streams.

Soils: Impacts to soils would be seen at the LHH project foot print site. There would be a permanent allocation of the soil resource to construct the facilities. At most, 3 acres would be allocated. With HETF lands located in the watersheds above and state and county lands located just below, it is not expected that major allocations of other soils in the area would occur, making this a very minor overall impact to the soils resource in the area.

Floodplains and Wetlands: Please see the Floodplains and Wetlands Section above for a discussion of effects.

Permits to be obtained

Three permits pertaining to water quality would need to be obtained before implementation of this project can occur. The Section 404 permit dealing with the placement of road fill into the Kapili stream must be obtained from the U.S. Army Corps of Engineers. Contact information for the regulatory branch of the Corps in Honolulu and how to apply for a permit are located in the planning record.

The second permit is the NPDES Individual Permit discussed above. This permit is obtained from the State of Hawaii Department of Health. Contact information and the individual permit form can be found at <http://hawaii.gov/health/environmental/water/cleanwater/index.html>

The third permit is the building permit which also includes the septic tank permit. It is important that the County of Hawaii approves the placement of the septic tank. The steps to applying for a building permit in the County of Hawaii are located in the planning record as well.

Mitigation Measures and Best Management Practices

The Best Management Practices Manual for Construction Sites in Honolulu 1999 was consulted regarding implementation of BMPs for the LHH Facilities Project. The Manual was the only document found for the State of Hawaii that specifically dealt with Construction BMPs. Implementation of these BMPs would insure protection of soil and watershed resources in the LHH project area into the future.

The entire Best Management Practices Manual for Construction Sites in Honolulu is located in the planning record. It is recommended that this document be reviewed prior to contract preparation. The following is a list of BMPs recommended to be implemented with this project:

- ESC1: Scheduling
- ESC2: Preservation of Existing Vegetation
- ESC3: Location of Potential Sources of sediment
- ESC10: Seeding and Planting
- ESC23: Construction Road Stabilization
- ESC25: Protection of Stockpiles
- ESC50: Silt Fence Installastion

References

County of Hawaii, Department of Public Works, How to Obtain a Building Permit webpage:
http://www.hawaii-county.com/permits/how_to_get_permit.html

Department of Environmental Services, City and County of Honolulu, May 1999, Best Management Practices Manual for Construction Sites in Honolulu, 144pp.

Description of Executive Order 11990, protection of wetlands:
<http://www.archives.gov/federal-register/codification/executive-order/11990.html>

Description of Executive Order 11988, Floodplain management:

<http://www.archives.gov/federal-register/codification/executive-order/11988.html>

Hawaii State Department of Health, Environmental Planning Office, 2008, 2006 State of Hawaii Water Quality Monitoring and Assessment Report, 40pp.

Natural Resources Conservation Service (NRCS) Soil Mart Data webpage:

<http://soildatamart.nrcs.usda.gov/>

United States Army Corps of Engineers webpage on how to apply for a Section 404 permit:

<http://www.poh.usace.army.mil/EC-R/EC-R.htm>

Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project Botany Report
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Laupahoehoe Research and Education Center Construction Project

Biological Assessment and Botany Report

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Date: 3/2/2009

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Introduction

The purpose of this Botanical Biological Report is to identify the likely effects of the proposed action on Threatened, Endangered and Rare Hawaiian plant species. This document conforms to the legal requirements set forth under Section 7 of the Endangered Species Act (19 U.S.C. 1536(c), 50 CFR 402.12(f) and 402.14(c)) and to the standards established in the Forest Service Manual direction (FSM 2672.42).

Description of the Proposed Action

Purpose and Need

To meet its full potential as a site for research, education and demonstration, construction of new research and education field station facilities is needed. The purpose of the Laupahoehoe Research and Education Center Construction Project is to provide facilities that will support Hawaii Experimental Tropical Forest (HETF) research, demonstration, and educational functions serving the entire Pacific Basin. Facilities that meet these purposes are not currently available at the Laupahoehoe site.

Proposed Action and Alternatives

Alternative 1 (No Action)

No facility construction or road repair.

Alternative 2 (Proposed Action: Buried Electrical Power Line and Green Energy)

The proposed action includes the following activities for facility construction:

- Two to three housing units (20 person sleeping quarter capacity) with centralized facilities, one caretakers living unit, one administrative unit with teaching and meeting rooms, utility storage buildings, rooftop water collection systems, permanent vehicle wash stations and a parking area (20 vehicle capacity). The parking area may serve as a helipad site, or may be constructed within the facility footprint depending on site design. Infrastructure development associated with construction would include trenching at specific locations within the facility footprint for electrical, propane for cooking, and septic systems. Depths of trenching will comply with all state and county regulations. Foot print of these facilities is approximately 1.5 to 3.0 acres.
- • Fencing for security and cattle/feral ungulate exclusion would be installed around the 1.5 to 3.0 acre facility site. Preparation of the fence corridor will involve trimming of vegetation with hand operated tools (i.e., handsaw, machete, weed eater, chainsaw) from a 6 foot (ft) wide corridor. A 4 to 6 foot high fence would be constructed using hog wire or chain link fence supported by wooden or steel fence posts. The top wire of the fence will be smooth to reduce any chances of injury to

birds or bats. To ensure exclusion of wild ungulates some barbed wire fence may be used and fencing mesh size may be more tightly woven closer to the ground and buried to exclude non-native predators. The fence would avoid any major geological, rare biological, terrestrial, or archeological/cultural features as determined by the archeological and biological surveys.

- All efforts in facility design would preserve existing native Ohia (*Metrosideros polymorpha*) and Papala Kepau (*Pisonia umbellifera*) trees. No more than 5% of native trees within the footprint area are expected to be necessary for removal for facility construction and safety concerns. Revegetation with native plants would occur in areas disturbed by construction activities within the facility footprint. Small native plant demonstration gardens for educational purposes may also be constructed and located within the facility complex footprint.
- Power for the center would be supplied by extension of electrical lines from existing service adjacent to Manowaiopae Homestead Road. Portions of electrical service would be buried between the low water crossing to the sharp turn up the slope (approximately 1,751 feet or 0.33 mile) to mitigate visual impacts (Figure 7. Electrical Line Burial Location Map).
- Although wind and solar energy sources alone cannot supply power necessary for the proposed center, installation of solar panels and wind generators would provide supplemental green energy for these facilities. One wind generator with a maximum height of 120 feet would be located near the center in an area that maximizes wind-power generation and is at least 100 feet away from existing trees. Solar panels as supplemental power would be located either on rooftops of facilities or on free-standing posts nearby. Installations of alternative energy sources would comply with all county building and zoning codes (<http://www.co.hawaii.hi.us/countycode/chapter25.pdf>).
- Limited road improvements such as grading to smooth out rough areas, and resurfacing in some areas would occur along Manowaiopae Homestead road. Minor road realignment at the Kapili stream crossing would provide safer passage during high water events and eliminate other safety concerns related to existing road undercut. A 12+/- foot shift of the roadway from the center of the Kapili steam road crossing and for the next 25 feet (traveling up the road) will improve the horizontal curve and also move away from the under cut. The elevation of the road may change slightly but will match the stream on the high side maintaining the same flow capacity.

Alternative 3 (Overhead Electrical Powerline and Green Energy)

Same as the proposed action alternative (Alternative 2) except power to the facilities would be above ground. The power line would run parallel to the Manowaiopae Homestead road within the road right-of way.

Alternative 4 (Propane Generation and Green Energy)

Same as the proposed action alternative (Alternative 2) except main power for the facilities would be generated by an onsite propane generation system. No extension of power lines from existing service would occur. Some above ground electrical lines

within the facility footprint (1.5 to 3 acre site) may occur at specific areas to provide service.

Alternative 5 (Buried Electrical Power Line and Green Energy from Solar Only)

Same as the proposed action alternative (Alternative 2) except wind turbines would not be installed.

Mitigation Measures

Mitigation measure specific to botanical resources associated with the proposed action include:

- Removal of native tree species will be minimized to 95% unaffected within the footprint facility construction area and disturbed areas will be restored with native plant species
- Prior to ground disturbing activities at facility site, all contractor equipment will arrive at the work site clean and free of invasive species seeds, roots or rhizomes. If an on-site temporary wash station is used, drainage from wash station will be controlled, removed from the construction site and treated appropriately.
- If sand, gravel, rock and mulch are transported for use at the facility site, it will be inspected and be certified as weed-free.
- Permanent invasive species wash station drainage will be controlled and treated appropriately.
- Routine treatment of invasive species within forest reserve and natural area reserves state boundaries will be completed by State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife staff. All policies and procedures can be found at: <http://www.hawaiiinvasivespecies.org/iscs/biisc/>

Scope and Time Frame

Design work is expected to be complete 2009 and construction to begin late 2009 or early 2010.

Analysis Area

The area of these proposed facilities is located in Hawaii County, 3.7 miles SSW of the town of Laupahoehoe (See Figure 1 and 2 in the Environmental Assessment). Property ownership of the area proposed for facility placement is located on state owned land under the A-20 zoned district. A 20 acre parcel leave has been established between the State of Hawaii and the USDA Forest Service for the construction of these site facilities (Figure 2). Road accessing the proposed facility area traverses through state and private property ownership. See Environmental Assessment Figures 3-5 for additional location maps and site photos.

Existing Condition

Historically, the lowlands of the Laupahoehoe region, and the areas covering fourteen ahupua'a, became the focus of sugar plantation efforts as early as the 1850s. But it was not until 1876, that a full-scale plantation was incorporated, and a mill established (Kumu Pono Associates 2006). The Laupahoehoe Sugar Company and Mill, secured fee-simple and lease-hold interest in lands of the Laupahoehoe vicinity. As the plantation developed, lowland forests, up to about the 2,000 foot elevation were cleared for cultivation of sugar, and development of flumes and water resources (Kumu Pono Associates 2006). As a part of the plantation development, and the efforts of the government to encourage settlement in the Laupahoehoe vicinity lands, homestead lots were also developed, and the lower boundaries of the forest reserve lands where the 20 acre leased parcel is located mark the edge of the homestead lots.

This basic geographic setting of the project site where the facilities are proposed includes a 20 acre parcel located at approximately 2,300 feet elevation in addition to the Manowaiopae Homestead road which begins at approximately 1,000 feet in elevation and traverses up to the facilities construction site. Adjacent land is primarily private, and state owned with scattered agricultural uses.

The vegetation along the road accessing the administrative facilities is mostly open pasture dominated by introduced grasses with non-native trees and a few occasional native trees scattered throughout. A portion of the road corridor runs through a stand of planted *Eucalyptus grandis*.

The vegetation within the 20 acre leased parcel is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia umbellifera* and *Acacia koa*) with thickets of non-native trees (*Toona ciliata*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*). Open area are dominated by pasture grasses. The area where the 20 acre leased parcel is located has been actively grazed with cattle for the past 30 years (Imoto 2009).

Species Considered and Evaluated

Prefield Review

A prefield review of existing information was conducted for the 20 acre leased parcel area and along the Manowaiopae Homestead road utilizing the following sources:

- aerial photographs
- topographic maps
- GIS data available at the Hawaii Statewide GIS program <http://hawaii.gov/dbedt/gis/> including vegetation layers, critical habitat designated areas, and other natural resource, and environmental layers (accessed 10/2008).
- Known threatened, endangered and rare plant locations derived from the Hawaii Natural Heritage Program (2008) and the Fish and Wildlife Service (2/2008)

- Pertinent species conservation strategies, status reviews, and research reports
- Discussion on individual species and habitat preferences with L. Perry (Hawaii District Botanist Division of Forestry and Wildlife 10/13/2008).

Prefield results indicated the closest known federally listed plant species is located approximately 500 meters south east of the southeastern most corner of the 20 acre leased parcel in the Natural Area Reserve (2,559 feet elevation). This observation was last documented in 1982 in an open ohia forest with an understory of hapu'u, hame, kopiko, manono, pile and strawberry guava.

Field Survey

L. Perry (Hawaii District Botanist, Division of Forestry and Wildlife) C. Perry (field technician and graduate student, USDA Forest Service, Institute of Pacific Islands Forestry) and J. Laufmann (USDA Forest Service TEAMS Planning Botanist) conducted field surveys along the road corridor and within the 20 acre leased parcel where ground disturbing activities are proposed for construction activities on 10/13/2008. A focused (Intuitive Controlled) survey as described within USDA Threatened and Endangered and Sensitive Plant Survey Guide (USDA 2005) was conducted within the project area, focusing on the footprint area where proposed ground disturbing activities are proposed (See Figure 4 of the EA). No threatened, endangered or rare species or habitats were identified within the area. Appendix A lists plant species identified during field surveys within the project area and road corridor.

Determination of Effects

No direct, indirect or cumulative impacts to Federally Listed plant species or rare plant species would occur from any of the proposed actions due to the fact that no habitat or plant species were identified.

Incorporation of mitigation measures would reduce impacts from project activities introducing invasive plants into the area. Revegetation with native species after construction is complete would increase the potential for creating some additional native plant habitat.

Management Recommendations

Protection of *Pisonia umbellifera* trees as much as possible

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Kumu Pono Associates LLC 2006. Hilo of the Upright Cliffs: A study of Cultural-Historical Resources of Lands in the Laupahoehoe Forest Section Ahupua'a of the Waipunaie-Maui Region, North Hilo District, Island of Hawai'i. Hilo, Hawaii.

USDA Forest Service 2005. Threatened, Endangered, and Sensitive Plant Survey Guidelines

http://fswb.nris.fs.fed.us/product/tesplants/10/files/tesp_survey_field_guide.doc
accessed 11/2007.

Appendix A. Laupahoehoe Facility Construction Project Plant Species List.

Laupahoehoe HETF Botanical Survey October 13th, 2008

List prepared by: Lyman Perry, Hawaii District Botanist, Division of Forestry and
Wildlife, Hilo, HI 96720

Powerline Corridor

The powerline corridor is mostly open pasture dominated by introduced grasses with non-native trees and the occasional native tree scattered throughout. A portion of the powerline corridor runs through a stand of planted *Eucalyptus grandis*. No endangered or threatened plant species or habitat was observed along this corridor.

Native trees:	Common Name:	Family Name:
<i>Metrosideros polymorpha</i>	Ohi`a	Myrtaceae

Non-Native trees:

<i>Aleurites moluccana</i>	Kukui	Euphorbiaceae
<i>Casuarina equisetifolia</i>	Ironwood	Casuarinaceae
<i>Eucalyptus grandis</i>		Myrtaceae
<i>Melia azederach</i>	Pride of India	Meliaceae
<i>Persea americana</i>	Avocado	Lauraceae
<i>Psidium cattleianum</i>	Strawberry guava	Myrtaceae
<i>Psidium guajava</i>	Common guava	Myrtaceae
<i>Spathodea complanata</i>	African tulip	Bignoniaceae

Non-Native shrubs:

<i>Buddleia asiatica</i>	Dog tail	Buddleiaceae
<i>Clidemia hirta</i> *	Koster's curse	Melastomataceae
<i>Cordyline fruticosa</i>	Ti leaf	Agavaceae
<i>Melastoma candidium</i>		Melastomataceae
<i>Pluchea symphitifolia</i>	Sourbush	Asteraceae

Non-Native Ferns, Grasses and Herbs:

<i>Andropogon virginicus</i> *	Broom sedge	Poaceae
<i>Adiantum hispidulum</i>	Rough maidenhair fern	Pteridaceae
<i>Arundina grandifolia</i>	Bamboo orchid	Orchidaceae
<i>Chamaecrista nictitans</i>	Partridge pea	Fabaceae
<i>Christella dentata</i>		Thelypteridaceae
<i>Christella parasitica</i>		Thelypteridaceae
<i>Coix lachryma-jobi</i>	Job's tears	Poaceae
<i>Cyperus rotundus</i>	nut grass	Cyperaceae
<i>Desmodium sandwicense</i>	Spanish clover	Fabaceae
<i>Hedychium</i> sp.	Ginger	Zingiberaceae

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<i>Melinis minutiflora</i>	Molasses grass	Poaceae
<i>Mimosa pudica</i>	Sensitive plant	Fabaceae
<i>Nephrolepis multiflora</i>	Scaly sword fern	Nephrolepidaceae
<i>Panicum maximum</i>	Guinea grass	Poaceae
<i>Paspalum conjugatum</i>	Hilo grass	Poaceae
<i>Paspalum urvillei</i>	Vasey grass	Poaceae
<i>Saccharum officinale</i>	Sugarcane	Poaceae
<i>Sacciolepis indica</i>	Glenwood grass	Poaceae
<i>Schizachyrium condensatum</i>	Bushy beard grass	Poaceae
<i>Sporobolus africanus</i>	African dropseed	Poaceae

Native Ferns:

<i>Cibotium glaucum</i>	Hapu`u pulu	Dicksoniaceae
<i>Dicranopteris linearis</i>	Uluhe	Gleicheniaceae

Laupahoehoe HETF 10 acre site

The 10 acre site is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia umbellifera* and *Acacia koa*) with thickets of non-native trees (*Toona ciliata*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*) and open areas dominated by pasture grasses. It is strongly recommended that care be taken not to harm the Papala kepau (*Pisonia umbellifera*) trees that are concentrated in the central portion of the 10 acre site. No threatened or endangered plant species or habitat were observed in this site.

Native Trees:

Native Trees:	Common Name:	Family Name:
<i>Acacia koa</i>	Koa	Fabaceae
<i>Metrosideros polymorpha</i>	Ohi`a	Myrtaceae
<i>Pisonia umbellifera</i>	Papala Kepau	Nyctaginaceae

Non-Native Trees:

<i>Ficus macrophylla</i>	Moreton Bay Fig	Moraceae
<i>Fraxinus uhdei</i>	Tropical Ash	Oleaceae
<i>Grevillea robusta</i>	Silk Oak	Proteaceae
<i>Psidium cattleianum</i>	Strawberry guava	Myrtaceae
<i>Psidium guajava</i>	Common guava	Myrtaceae
<i>Toona ciliata</i>	Australian Red Cedar	Myrtaceae

Non-Native shrubs:

<i>Clidemia hirta</i>	Koster's curse	Melastomataceae
<i>Solanum nigrum</i>	Popolo	Solanaceae
<i>Tibouchina herbacea</i>	Cane Tibouchina	Melastomataceae

Non-native Ferns, Grasses and Herbs:

<i>Ageratum conyzoides</i>	maile-hohono	Asteraceae
<i>Andropogon virginicus</i> *	Broom Sedge	Poaceae
<i>Axonopus fissifolius</i>	Narrow-leaved Carpetgrass	Poaceae
<i>Blechnum appendiculatum</i>		Blechnaceae

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<i>Chamaecrista nictitans</i>	Partridge pea	Fabaceae
<i>Christella dentata</i>		Thelypteridaceae
<i>Christella parasitica</i>		Thelypteridaceae
<i>Cirsium vulgare</i>	Bull thistle	Asteraceae
<i>Commelina diffusa</i>	Honohono	Commelinaceae
<i>Cuphea carthagenensis</i>	Tarweed	Lythraceae
<i>Cyperus halpan</i>		Cyperaceae
<i>Cyperus rotundus</i>	Nut sedge	Cyperaceae
<i>Drymaria cordata</i>	Pipili	Caryophyllaceae
<i>Ehrharta stipoides</i>	Meadow ricegrass	Poaceae
<i>Geranium carolinianum</i>	Carolina crane's bill	Geraniaceae
<i>Hydrocotyle verticillata</i>	Pohe	Apiaceae
<i>Hypochoeris radicata</i>	Hairy cat's ear	Asteraceae
<i>Lapsana communis</i>	Nipplewort	Asteraceae
<i>Mimosa pudica</i>	Sensitive plant	Asteraceae
<i>Nephrolepis cordifolia</i>	Narrow sword fern	Nephrolepidaceae
<i>Oxalis corniculata</i>	Yellow wood sorrel	Oxalidaceae
<i>Paspalum conjugatum</i>	Hilo grass	Poaceae
<i>Phymatosorus grossus</i>	Lau`e	Polypodiaceae
<i>Poa annua</i>	Annual bluegrass	Poaceae
<i>Polygala paniculata</i>	Milkwort	Polygalaceae
<i>Polygonum punctatum</i>	Kamole	Polygonaceae
<i>Prunella vulgaris</i>	Self heal	Lamiaceae
<i>Sacciolepis indica</i>	Glenwood grass	Poaceae
<i>Setaria geniculata</i>	Foxtail	Poaceae
<i>Taraxacum officinale</i>	Common dandelion	Asteraceae
<i>Verbena littoralis</i>	weed verbena	Verbenaceae
<i>Veronica plebeia</i>	Common speedwell	Scrophulariaceae

Native Ferns, Fern Allies, Herbs and Vines:

<i>Cibotium menziesii</i>	Hapu`u i`i	Dicksoniaceae
<i>Dianella sandwicensis</i>	`Uki	Liliaceae
<i>Dicranopteris linearis</i>	Uluhe	Gleicheniaceae
<i>Elaphoglossum wawrae</i>	Ekaha	Lomariopsidaceae
<i>Freycinetia arborea</i>	I`ei`e	Pandanaceae
<i>Peperomia membranacea</i>	Ala`ala wainui	Piperaceae
<i>Psilotum nudum</i>	Moa	Psilotaceae

* Invasive and Noxious Weeds (State of HI listing <http://plants.usda.gov/java/noxious?rptType=State&statefips=15> accessed 1/22/2009)

Pacific Southwest Research Station – Institute of Pacific Islands Forestry - Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project

Wildlife Report

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Introduction

In 1992, the Hawaii Tropical Forest Recovery Act authorized the establishment of Hawaii Experimental Tropical Forest (HETF) to serve as a center for long term research and a focal point for developing and transferring knowledge and expertise for the management of tropical forests. Objectives for establishing Hawai'i Experimental Tropical Forest are: (1) to provide lands for conducting research that serves as bases for the restoration, conservation and management of forests in Hawai'i and across tropical areas served by the Pacific Southwest Research Station, (2) to provide education facilities for the general public and University and Forest Service staffs, and (3) to serve as a site providing local, regional, and global long-term environmental monitoring data

There are two units of the HETF. Currently they are referred to as the Laupāhoehoe Experimental Forest (LEF) unit, and the Pu'u Wa'awa'a Experimental Forest Unit. Both experimental forest units are located on lands managed by the Department of Land and Natural Resources (DLNR). The site is administered by the Hawai'i Division of Forestry and Wildlife and the U. S. Forest Service under a 35-year Cooperative Agreement establishing the Hawai'i Experimental Tropical Forest. The LEF unit incorporates 1800 hectares of land designated as Forest Reserve, and 3195 hectares of land designated as a Natural Area Reserve (NAR).

To meet its full potential as a site for research, education and demonstration, construction of new research and education field station facilities is needed. The purpose of the Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project is to provide facilities that will support HETF research, demonstration, and educational functions serving the entire Pacific Basin. This report describes the current wildlife habitat condition that exists within and adjacent to the Laupahoehoe (LAU) facility site and evaluates effects to wildlife and wildlife habitat from activities proposed in the Laupahoehoe research and education center construction project Environmental Assessment (EA).

Project Area Description

The LAU facility site is immediately adjacent to the LEF Unit. Although the habitat conditions found on the LAU site are different from those provided on the LEF unit, the native forest conditions that predominate on the experimental unit influence wildlife that occur on the site. As a result habitat conditions on both the LEF unit and Laupahoehoe LAU facility site are discussed.

Laupahoehoe Experimental Forest Unit

A total of nine wet forest locations were considered as experimental forest. Due to the unique and abundant resource opportunities, diversity of vegetative conditions and proximity to the new research center in Hilo, the Laupahoehoe forest area was among the highest ranked. The LEF unit incorporates 1800 hectares of land designated as Forest Reserve, and 3195 hectares of land designated as a Natural Area Reserve (NAR). The unit is located on the windward side of the Island of Hawai'i on the slopes of the Mauna Kea Volcano. The 5000 ha site contains magnificent examples of primary wet and rain forest and is the habitat to numerous endangered plant and animal species.

The LEF unit contains native-dominated forested landscapes from lowland forest at 700 m above sea level extending through four Holdridge life zones to almost 2,000 m in elevation. It is part of the largest remaining native dominated forest in Hawai‘i. Forests are largely dominated by ‘Ōhi‘a (*Metrosideros polymorpha*) and Koa (*Acacia koa*), the two most widespread tree species in native forest remaining in Hawai‘i. Seven headwater streams originate in the experimental forest provide excellent opportunities to conduct hydrologic and aquatic ecology studies.

Laupahoehoe Facility Site

The area of the proposed facilities is located in Hawaii County, 3.7 miles SSW of the town of Laupahoehoe. Property ownership of the area proposed for facility placement is located on state owned land under the A-20 zoned district. A 20 acre (50 hectare) parcel has been established between the State of Hawaii and the USDA Forest Service for the construction of these site facilities. The parcel is approximately 2,300 feet in elevation and the project area includes the Manowaiopae Homestead (MH) road, which begins at approximately 1,000 feet in elevation and traverses to the facility construction site (See Maps 1 and 2 in Appendix A). Adjacent land is primarily private, with some State owned land.

Because the LAU site lies between the LEF unit (to the south) and highly developed lands (to the north), vegetation on the site is a mix of native and non-native vegetation. The following is a brief discussion of the history and disturbances that largely resulted in vegetation and habitat conditions that exists on the LAU site today.

Historically, the lowlands of the Laupahoehoe region were the focus of sugar plantation efforts as early as the 1850's. But it was not until 1876, that a full-scale plantation was incorporated, and a mill established (Kumu Pono Associates 2006). As the plantation developed, lowland forests, up to about 2000 feet in elevation were cleared for cultivation of sugar, and development of flumes and water resources (Kumu Pono Associates 2006). As part of the plantation development and to encourage settlement in the area, homestead lots were also developed and the lower boundaries of the forest reserve lands, where the 20 acre leased parcel is located marks the edge of the homestead lands. Consequently the landscape surrounding the site (See Figure 1 in Appendix A) includes largely native forest to the southwest and plantations dominated by eucalyptus (*Eucalyptus spp.*), degraded pastures, and abandoned sugar cane fields to the northeast.

Vegetation within the lease is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia unbellifera* and *Acacia koa*) with thickets of non-native trees (*Toona ciliate*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*) (See Figures 1 and 2 in Appendix A). Open areas which are dominated by pasture grass occur on approximately 40% of the site and it is in an area such as this on the West side of the lease that the facility would be constructed (See Map 2 and Figure 2 in Appendix A). Lands in and around the site have been actively grazed with cattle for the past 100 years and this grazing in combination with browsing by feral pigs have resulted in the predominance of non-native vegetation that dominates the site today. The site also contains a small pond in the northwest portion of the site (See Figure 3 in Appendix A).

The Manowaiopae Homestead (MH) road provides primary access to the site from Laupahoehoe. Most of the road runs through forested stands or along narrow forested corridors. Vegetation along the MH road includes cane fields, eucalyptus stands and grazed pasture interspersed with native and non-native vegetation. Like the lease site, all adjacent lands are heavily grazed by feral pigs and cattle, with heavy pig damage in some areas.

Proposed Action

The project site of proposed facilities is located in Hawaii County, 3.7 miles south/southwest of the town of Laupahoehoe. The following is a summary of the proposed actions:

- Two to three housing units (20 person sleeping quarter capacity) with centralized facilities, one caretakers living unit, one administrative unit with teaching and meeting rooms, utility storage buildings, rooftop water collection systems, permanent vehicle wash stations and a parking area (20 vehicle capacity). The parking area may serve as a helipad site, or may be constructed within the facility footprint depending on site design.
- Fencing for security and cattle/wild ungulate exclusion would be installed around the 1.5 to 3.0 acre facility site.
- Power for the facilities would be supplied by extension of electrical lines from existing service adjacent to the MH Road. Although the height of the power line will vary somewhat depending on topography, it will be approximately 30 feet in height and will be installed along the MH road corridor (approximately 2.5 miles total). All but approximately 0.3 miles of the proposed power line would occur as overhead lines within corridors that are predominately forested. That portion of the line that crosses a non-forested habitat (0.3 miles) would be buried along the MH road Right-Of-Way (ROW). Also some overhead lines may be necessary at the facility site (See Map 3 in Appendix A).
- Alternative energy power sources would be installed to supplement energy needs for facilities. Wind and solar alone cannot supply all power necessary for the proposed facilities, however, wind generators and solar panels would be placed near or on facility structures to supplement energy needs and reduce usage from other power sources. A wind generator would be located in areas that maximize power generation and would be limited to a maximum tower plus rotor height of 120 feet. Solar panels would be located either on rooftops of facilities or on free standing posts nearby. All installations of alternative energy sources would comply with all county building and zoning codes (<http://www.co.hawaii.hi.us/countycode/chapter25.pdf>).
- Limited road improvements such as grading to smooth out rough areas, and resurfacing in some area would occur along MH road. No road widening beyond exiting existing road template or major resurfacing would occur except for the road repair at the Kapili stream crossing. A minor road realignment at the Kapili stream crossing would provide safer passage during high water events and eliminate other safety concerns related to existing road undercut. A 12+/- foot shift of the roadway from the center of the Kapili steam road crossing and for the next 25 feet (traveling up the road) will improve the horizontal curve and also move away from the under cut. The elevation of the road may change slightly but will match the stream on the high side maintaining the same flow capacity. The existing crossing will remain intact where it is not undercut, however traffic will be diverted away from existing road undercut. Water depth indicators will be placed on each side of the stream crossing to alert vehicle drivers of water depth in the event of a large storm event.

Under the preferred alignment, it is anticipated that very little native vegetation will be impacted by facility or fence construction, as the site has been heavily grazed and much of the existing

vegetation on the site is non-native. Native trees present within the area would be protected as much as possible. Design and placement would consider protection of all existing native trees and it is estimated that 95% of the native vegetation on the site would be unaffected.

Regulatory Framework

The following is a summary of the principle laws and direction relevant to wildlife:

- Endangered Species Act of 1973 (ESA): The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. Under provisions of the ESA, federal agencies are directed to seek to conserve endangered and threatened species and to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats. Whenever an action may affect a species that is listed (or proposed for listing) or its habitat, federal agencies must consult with the U. S. Fish and Wildlife Service
- Migratory Bird Treaty Act (MBTA) of 1918 (Executive Order 13186) (MBTA): The MBTA established an international framework for the protection and conservation of migratory birds. This act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird.
- National Environmental Policy Act (NEPA): The NEPA requires that all federal agencies evaluate environmental impacts of their actions and disclose anticipated effects to the public.
- HRS 34-4 item 3 Flora and Fauna: The purpose of this regulation is to protect endangered species of indigenous plants and animals, ensure that any introduced species would not result in ecological hazards and foster the planting of native vegetation. Any activities proposed must analyze and evaluate effects to endangered species, their critical habitat and native vegetation.
- State of Hawaii Department of Land and Natural Resource (DLNR): The State DLNR, Division of Forestry and Wildlife (Chapter 124) provide direction to conserve, manage, protect, and enhance indigenous wildlife and managed introduced birds. This is accomplished through Hawaii’s Comprehensive Wildlife Conservation Strategy (CWCS), which is used to identify species in the state of greatest conservation need. The CWCS provides information on the distribution and abundance of these specie’, identifies the location and condition of key habitats, described major threats and proposes conservation actions and monitoring necessary to ensure the long-term protection of Hawaii’s overall natural biodiversity http://www.state.hi.us/dlnr/dofaw/cwcs/Conservation_need.htm.

Method of Analysis

Analysis Process

A three-step process was used to identify and assess potential impacts to wildlife and wildlife habitat. The following is a summary of the process used:

This is a controlled document:

The official version is located in the project record at the Institute of Pacific Islands Forestry.

Site Assessment – Once the proposed action was identified a site assessment was completed. This included completing wildlife surveys on and near the project area and a review of the USFWS species site list (USFWS 2008), NAR survey records and a review of historical records and documentation (NAR 2008). This information was used to evaluate habitat conditions on the LAU site and assess potential impacts. Wildlife surveys considered included; 1) a list of species from the USFWS that occur in or near the project area (USFWS 2008), 2) bird survey information from species documented in or near the natural area reserve (NAR 2008), 3) Hawaiian hoary bat surveys (USGS 2007) conducted by the USGS in the Laupahoehoe Natural Area Reserve and 4) bird surveys conducted on the LAU site by the University of Hawaii (UH 2008).

In addition to the above wildlife surveys, site plant surveys were conducted by State of Hawaii and USDA Forest Service botanists on 10/13/2008. This information in combination with, aerial photographs, GIS data (<http://hawaii.gov/dbedt/gis/>) and species specific geographic distribution information (recovery plans, CWS fact sheets), were used to assess habitat conditions and species occurrence on the site. Survey and site specific information was also used to develop mitigation measures or modifications to the proposed action that may be necessary to reduce or eliminate impacts to wildlife.

Wildlife Screening – Species that were considered in this evaluation included 1) Threatened and Endangered Species listed under ESA, as well as candidate species and species proposed for listing (T&E) and 2) Hawaii's Species of Greatest Need (SOGN) identified in the state wildlife conservation strategy. These species were selected for evaluation so that potential effects to species most at risk (T&E), as well as effects to endemic species could be assessed. Also by minimizing impacts and maintaining habitat for these species, Hawaii's natural wildlife diversity would be maintained. Using information from the site assessment, T&E and SOGN species that were likely to be affected were identified (See Table 3) and carried forward for effects analysis.

Habitat and Species Assessment – Using information from the site assessment and wildlife screening step, anticipated direct and indirect impacts from proposed activities to individual species as well as changes in wildlife habitat condition on the LAU site were assessed. As described above, the lease site lies in an area of transition between the predominately forested experimental forest to the south and agricultural and highly developed lands to the north. In order to assess potential effects without including lands that are not characteristic of the site, the analysis area used to assess direct, indirect and cumulative effects area was identified by creating a quarter mile buffer of all lands on the lease site and along the MH road corridor where work is proposed. This area was selected because; 1) it includes all lands affected by proposed activities, 2) habitat conditions in this area are consistent with those affected by the proposal, and 3) it is large enough to include the home range of native passerine species affected, as well as assess effects to foraging, nesting and roosting habitat of other native species.

Cumulative effects were evaluated by looking at on-going and anticipated future actions on all lands within the analysis or project area. Past actions are evaluated by looking at the amount and quality of habitat on the site today, whereas future actions were evaluated by looking at activities on all ownerships that may occur within the analysis area in the next five years (2014). This future period was selected because it is anticipated that proposed construction work would be completed within the next two years and all action alternatives include three years of monitoring to assess potential impacts to T&E species.

Alternatives Considered

The following are alternatives being considered for implementation of activities proposed on the LAU site.

Alternative 1 (No Action)

Under the No Action alternative, no ground disturbing activities, facility construction or minor road improvements would occur. Research activities associated with the HETF would continue to occur, requiring research scientists to travel to HETF on a more frequent basis from Hilo or other places of residence to conduct research. Educational program scope would be reduced due to the absence of teaching rooms and facilities. Grazing activity would continue to occur on the site.

Alternative 2 (Proposed Action Buried Electrical Power Line and Green Energy)

Described above under Proposed Action

Alternative 3 (Power for Facilities from Overhead Power line and Green Energy)

Same as the proposed action alternative (Alternative 2) except that all power to the facilities would be above ground. The power line would run parallel to the MH road within the road right-of way.

Alternative 4 (Power for Facilities from Propane Generation and Green Energy)

Same as the proposed action alternative (Alternative 2) except main power for the facilities would be generated by an onsite propane generation system. No extension of power lines from existing service would occur. Some above ground electrical lines within the facility footprint (1.5 to 3 acre site) may occur at specific areas to provide service.

Alternative 5 (Buried Electrical Power Line and Green Energy from Solar Only)

Same as the proposed action alternative (Alternative 2) except the proposed wind turbine would not be installed. Alternative 5 reduces potential impacts to the federally listed Hawaiian hoary bat, Hawaiian petrel and Newell's shearwater.

Affected Environment

This section describes the affected environment and includes a section on wildlife in general, as well as a species specific discussion of federally threatened and endangered species and Hawaii Species of Greatest Need.

Wildlife (General)

There are only two native mammals on Hawaii, include the Hawaiian Hoary Bat (*Lasiurus cinereus semotu*) and the Hawaiian Monk Seal (*Monachus schauinslandi*). Because the project site is over 3 miles from the coast, there are no anticipated impacts to any marine mammals or sea turtles. As a result the analysis presented will focus on the Hawaiian hoary bat and bird species potentially affected.

In order to assess bird diversity on the LAU site, bird surveys were conducted in October 2008 by the University of Hawaii. Although all species detected were documented, the survey targeted Federal and State listed Threatened and Endangered species. The survey area included

approximately 23 acres including the 20 acre leased site and the MH road corridor. The road transect followed 2.5 miles of the MH road, with stations placed 250 m. apart (14 plots total), whereas the 20 acre (with 50 m. perimeter buffer) lease site had four transects with five stations/transect (25 plots total) (See Maps 3 and 4 in Appendix B). Presence/absence was determined using 25 meter fixed-radius circular plots (Ralph *et al* 1995, Camp *et al* 2008) and incidental detections of target species were also recorded between stations.

The survey was conducted during the non-breeding season of target species. Because these species are non-migratory, the survey should account for all targeted threatened and endangered species that make frequent use of the area, and as residents. Also because species detected are residents, it would be expected that these species would be present during the breeding season. Assuming detection probability increases during the breeding season, this survey should be considered a conservative estimate of target species presence/absence (UH 2008). Table 1 summarizes the species detected and identifies whether they were detected on road or site plots, identifies preferred habitat and displays the total number of plots detected for each species.

Table 1: Bird Species Detected on the Laupahoehoe Lease and Road Corridor

Species	Preferred Habitat	# of Plots Detected ³ (Lease Site) 25 total	# of Plots Detected ³ (Road) 14 total
Native/Endemic Species			
Hawaiian Hawk ¹ (<i>Buteo solitarius</i>)	Forest/shrub/grassland	0	1
Hawaii 'amakihi ² (<i>Hemignathus virens</i>)	Forest/shrub	4	0
liwi ² (<i>Vestiaria coccinea</i>)	Forest	2	0
'Apapane ² (<i>Himatione sanguinea</i>)	Forest	25	2
Non-Native Species			
Black Francolin (<i>Francolinus francolinu</i>)	Grassland	0	1
Common Myna (<i>Acridotheres tristis</i>)	Grassland	0	5
House Finch (<i>Carpodacus mexicanus</i>)	Shrub/savanna/woodland	8	4
House Sparrow (<i>Passer domesticu</i>)	Shrub/savanna/woodland	1	1
Japanese White-eye (<i>Zosterops japonica</i>)	Forest/shrub/grassland	25	12
Kalij Pheasant (<i>Lophura leucomelano</i>)	Forest/shrub	4	1
Melodious Laughing Thrush (<i>Garrulax canorus</i>)	Forest/shrub	1	1
Northern Cardinal (<i>Cardinalis cardinalis</i>)	Forest/shrub	12	14
Nutmeg Mannikin (<i>Lonchura punctulat</i>)	Grassland/open woodland	0	7
Red-billed Leothrix(<i>Leothrix lute</i>)	Forest/shrub	25	11
Red Avadavat(<i>Amandava amandava</i>)	Grassland	0	2
Spotted Dove (<i>Streptopelia chinensi</i>)	Grassland/open woodland	2	4
Zebra Dove (<i>Geopelia striata</i>)	Grassland	0	3

- 1 – Federally Endangered
- 2 – Hawaii Species of Greatest Need
- 3 – Detections over two days of survey

A total of 17 species were documented during the two days of surveying including four native/endemic species and 13 non-native species. While the lease site contains a mix of open and forested habitat including both native and non-native vegetation, habitat along the road includes a much larger component of openings and grassland/agricultural habitat. This difference

in habitat condition is partially reflected in the species detected (See Table 1). For example native honeycreepers (Hawaii amakihi, Iiwi, apapane) are strongly associated with native ohia (*Metrosideros polymorpha*) and koa (*Acacia koa*), which are scattered across the lease, whereas grassland species that utilize non-native vegetation such as the black francolin, red avadavat and common myna were only documented along the open road corridor.

The mid-elevation location and disturbance history of this site also affects the habitat suitability of many species. For example, historically, the federally endangered Hawaiian honeycreeper (*Oreomystis mana*), Hawai'i 'Ākepa, (*Loxops coccineus coccineus*) and 'akiapōlā'au (*Hemignathus munroi*) occupied koa/ōhi'a forest in this area. However due to past development described previously and conversion of native forest, in combination with habitat degradation caused by feral pigs and cattle, suitable habitat for these and other many other native wildlife is now restricted largely to upper elevation habitat, which has received less degradation. Finally, many birds including Hawai'i creepers are rarely found below about 1,500 meters (5,000 feet), probably because of the distribution of mosquitoes that transmit avian malaria and avian pox (USFWS 2006a).

The Hawaii 'amakihi was also documented during the bird survey, however this species is more widely distributed and continues to occur at mid to lower elevations (DOFAW 2005k). Similarly, although Iiwi were documented on the site, this species occurs at greater numbers above 4100 ft. elevation and occurs at reduced densities at mid-elevation habitat that characterizes the lease (DOFAW 2005m). Also 'Apapane are the most abundant and widely distributed of the Hawaiian honeycreepers (DOFAW 2005c) and often travel great distances and forage over openings (Natureserve 2008), as is indicated by the large number of detections on the lease and occasional detections along the road corridor.

Wildlife (Species Specific)

In order to determine the scope of analysis, a preliminary evaluation was conducted for each potentially affected species. Table 2 identifies eight T&E species that were considered, but were not evaluated in detail in this analysis. Specific rationale for their elimination from detailed study is provided in Table 2. Table 3 displays the 16 species that will be evaluated in detail in this analysis and includes federally listed T&E species, as well as Hawaii SOGN that have been documented in the last 20 years, or which have suitable habitat on the Laupahoehoe site. Threatened and Endangered species that don't have suitable habitat on the site, but may be affected by activities proposed on the site are also displayed in Table 3.

Table 2: Species Considered and Eliminated From Detailed Analysis

Species	Rationale for Elimination from Detailed Analysis
Threatened and Endangered Species ¹	
Ō'ū (E) <i>Psittirostra psittacea</i>	There is no recent documentation in or near the site (USFWS 2008, NAR 2008) and it is unlikely this species would occur on site. Due to the predominance of non-native vegetation including pasture grass, the site does not provide preferred understory species that characterize current habitat of this species. Consequently there are no effects to this species or its habitat anticipated.
Akia pōlā'au (E) <i>Hemignathus munroi</i>	Not documented during site bird surveys (UH 2008). USFWS documentation occurs 5 miles south of the project area in closed canopy forest 5000 ft in elevation. The project area does not provide preferred upper elevation (>4000 ft) habitat dominated by Koi or Ohi 'a trees. Consequently there are no effects to this species or its habitat anticipated.

Species	Rationale for Elimination from Detailed Analysis
Palila (E) <i>Loxioides bailleui</i>	Not documented in or near the site (USFWS 2008, NAR 2008, UH 2008), which does not provide preferred upper elevation Mamane/naio forest habitat. Consequently there are no effects to this species or its habitat anticipated.
Hawai'i 'Ākepa (E) <i>Loxops coccineus occineus</i>	Not documented in or near the project area (USFWS 2008, UH 2008). Although occasional Ohī'a trees occur on the site, non-native vegetation dominates and the mid-elevation (below 2400 ft.) forest/savanna does not provide preferred old growth habitat. Consequently there are no effects to this species or its habitat anticipated.
Hawaiian Black-necked stilt (E) <i>Himantopus mexicanus knudseni</i>	Not documented in or near the project area (USFWS 2008, NAR 2008). The site does not provide preferred wetland/shallow water habitat. Consequently there are no effects to this species or its habitat anticipated.
Hawaiian Coot (E) <i>Fulica alai</i>	Not documented in or near the project area (USFWS 2008, NAR 2008). The project area does not provide preferred wetland/freshwater reservoir habitat. Consequently there are no effects to this species or its habitat anticipated.
Hawaiian Moorhen (E) <i>Gallinula chloropus sandvicensis</i>	Not documented in or near the project area (USFWS 2008, NAR 2008). The project area does not provide low elevation wetland habitat. Consequently there are no effects to this species or its habitat anticipated.
Blackburn's sphinx Moth (E) <i>Manduca blackburni</i>	No documentation in or near the project area (USFWS 2008, NAR 2008). The project area is outside the historic range of this species. No trees in the genus <i>Nothcestrum</i> occur on site and it is unlikely this species would occur within the project area. Consequently there are no effects to this species or its habitat anticipated.
Pomace Fly (T) <i>Drosophila mulli</i> <i>D. heteroneura</i> <i>D. ochrobasis</i>	There is no proposed critical habitat near the Laupahoehoe site for these species. Also <i>Pritchardia beccariana</i> , their primary host plant was not observed during botanical surveys of the site conducted on 10/13/2008. Consequently there are no effects to these species or their habitat anticipated and implementation of the proposed action will have No Effect on <i>Drosophila mulli</i> , <i>D. heteroneura</i> or <i>D. ochrobasis</i> .

1 - T&E Species Status: (E) – Endangered, (T) – Threatened

Table 3: Species Analyzed in Detail

Species	Project Area Status
Threatened and Endangered Species ¹	
Hawaiian hoary bat (E) <i>Lasiurus cinereus semotus</i>	No surveys have been conducted on site, however use of the Laupahoehoe reserve is well documented and the site (USFWS 2008 & USGS 2007) is considered occupied foraging and roost habitat.
Hawaiian hawk (E) <i>Buteo solitarius</i>	Use is documented throughout the area (USFWS 2008, NAR 2008) and this species was observed during bird surveys of the site (UH 2008). Although there are no known nests, the site provides suitable nest and foraging habitat.
Hawaiian duck (E) <i>Anas wyvilliana</i>	Although not documented on site (UH 2008), it has been documented 1 mile south of the project area (USFWS 2008) and on the reserve (NAR 2008). There is a 40 ft. X 30 ft. pond in the northeast portion of the unit (See Figure 3 in Appendix A) which provides potentially suitable habitat.
Hawaiian Crow (E) <i>Corvus hawaiiensis</i>	Although the project area is outside its current range, historic documentation (1971) occurs 5 miles south of the project area in the HILO forest reserve (USFWS 2008). Although there are no individuals known to occur in the wild, the project area does provide potentially suitable habitat.
Hawaiian goose (Nēnē) (E) <i>Branta sandvicensis</i>	No documentation in or near the project area (USFWS 2008, NAR 2008, UH 2008) and the site occurs outside its current range. Although it is unlikely this species occurs on the site, the project area provides suitable mid-elevation shrub habitat.

Species	Project Area Status
Hawai'i Creeper (E) <i>Oreomystis mana</i>	Not documented on site (UH 2008), although documented occurs north and south of the project area (USFWS 2008) and in the reserve (NAR 2008). Suitable habitat is present within the project area.
Newell's Shearwater (T) <i>Puffinus auricularis</i>	No documentation in or near the project area (USFWS 2008, NAR 2008) and the project area does not provide suitable breeding habitat. However the area does provide possible transitory habitat and the proposed wind turbine and power lines do have the potential to adversely affect this species.
Hawaiian Petrel (E) <i>Pterodroma phaeopygia sandwichensis</i>	No documentation in or near the project area (USFWS 2008, NAR 2008) and the project area does not provide preferred breeding habitat. However the area does provide possible transitory habitat and the proposed wind turbine and power lines do have the potential to adversely affect this species.
Hawaii Species of Greatest Need (CWCS)	
Short-eared Owl, Pueo <i>Asio flammeus sandwichensis</i>	Although there is no recent documentation in or near the project area (NAR 2008, UH 2008), portions of the site do provide suitable open grassland/shrubland habitat.
Hawaii 'Elepaio <i>Chasiempis sandwichensis sandwichensis</i>	Although these species was not documented during the 2008 bird survey (UH 2008), they have been documented on the reserve (NAR 2008) and the site provides suitable habitat.
Hawaii Thrush, 'Oma'o <i>Myadestes obscurus</i>	
'Apapane <i>Himatione sanguinea sanguinea</i>	The site provides suitable habitat and these species have been documented on the reserve (NAR) and on the project site (UH).
'I'iwi <i>Vestiaria coccinea</i>	
Hawaii 'Amakihi <i>Hemignathus virens virens</i>	

1 - T&E Species Status: (E) – Endangered, (T) – Threatened

Federally Threatened and Endangered Species

The following is a discussion of the species life history, threats, recovery strategies and availability of suitable habitat for federally threatened and endangered species identified in Table 3.

Hawaiian Hoary Bat

Taxonomy and Species Description

The Hawaiian hoary bat is the only native terrestrial mammal from the Hawaiian archipelago (USFWS 1998). The Hawaiian hoary bat is a medium-sized (14 to 22 gm; 0.5 to 0.8 oz), nocturnal, insectivorous bat with short, thick, rounded ears, a wingspan measuring 26.9 to 34.6 cm (10.5 to 13.5 in), and a furry tail. "Hoary" refers to the white-tinged, frosty appearance of the bat's grayish brown or reddish brown fur. Although females are slightly larger than males, forearm lengths are similar in both genders. These bats are not colonial, and roost solitarily in tree foliage.

The Hawaiian hoary bat is classified under the Family *Vespertilionidae* of the Suborder Microchiroptera, and is one of three recognized hoary bat subspecies. The other two subspecies are *Lasiurus cinereus cinereus*, one of the most common and widespread bats in North America and *Lasiurus cinereus vilosissimus*, which occurs in South America and the Galapagos.

This is a controlled document:

The official version is located in the project record at the Institute of Pacific Islands Forestry.

Morphologically, the Hawaiian hoary bat may have diverged significantly from the North American form, as Hawaiian hoary bats are about 45 percent smaller. Nonetheless, preliminary genetic analysis indicates the Hawaiian hoary bat may be derived from the North American hoary bat. The low degree of genetic divergence, however, suggests subspecies classification may be appropriate (USFWS 1998).

Historic and Current Distribution

The Hawaiian hoary bat is endemic to the state of Hawaii and has been documented historically on the islands of Hawaii, Maui, Molokai, Oahu, and Kauai. This bat is now resident only on Hawaii, Maui, and Kauai, with the largest populations probably on Hawaii and Kauai; no evidence of a breeding population (*e.g.*, pregnant or lactating females) has been documented on Maui (USFWS 1998). Occasional observations of bats on Oahu, Molokai and Lanai are considered to be migrant or vagrant individuals from other islands.

There are no population estimates for the Hawaiian hoary bat and few historical records. Unsubstantiated population estimates across the state have ranged from hundreds to a few thousand (USFWS 1998). Data are limited because no feasible method currently exists for surveying the abundance and distribution of solitary, tree-roosting bats but efforts are underway to develop such methods using automated ultrasound detectors (Gorresen *et al.* 2008). The Hawaiian hoary bat's distribution may be broader than indicated by the current limited information resulting from localized search efforts (USFWS 1998). The Hawaiian hoary bat occurs primarily below 1,219 m (4,000 ft) elevation, although on Hawaii it commonly is seen at 2,133 to 2,438 m (7,000 to 8,000 ft).

Hawaiian hoary bats are most numerous on the island of Hawaii, where they are uncommon but fairly widespread (Jacobs 1994). Bats have been detected in both wet and dry areas of Hawaii but seem to be more abundant on the drier leeward side (Jacobs 1994) and generally less abundant in wet areas (Kepler and Scott 1990 *In* USFWS 1998). Bat occurrence on Hawaii has been found to be very low in the windward lowlands during winter with a dramatic increase in activity from late spring through autumn (USGS 2007). Sites above 1600 m (5,249 ft) had highest occupancy during the winter months.

Life History

Hawaiian hoary bats are generally considered to be tree-roosting bats of primarily forested areas, similar to the North American hoary bat. Hawaiian hoary bats roost in a variety of tree species during the day and forage in a wide range of habitat types during the night. There is no information on the Hawaiian hoary bat's average life span, age at first reproduction, survivorship, how age and reproductive condition affect its food habits, habitat selection, home range size, and movement patterns.

Breeding probably occurs most frequently between September and December, with birth of two young occurring in May or June. Hawaiian hoary bat activity apparently varies seasonally, but the nature and timing of this variation is unclear. Although seasonal inter-island and elevational migration has been suggested, migration on the scale of the mainland North American Hoary Bat is unknown in the Hawaiian hoary bat (Kepler and Scott 1990 *In* USFWS 1998). USGS (2007) found that Hawaiian hoary bat occurrence was very low in the windward lowlands of Hawaii during winter with a dramatic increase in activity from late spring through autumn. Sites above 1600 m (5,249 ft) had highest occupancy during the winter months.

On Hawaii, males may be fertile year-round, but breeding probably occurs most frequently between September and December, with parturition (birth of young) occurring in May or June (USFWS 1998). Lactating (producing milk) females have been documented between late June and early August, and females examined between September and December were post lactating (USFWS 1998).

Hawaiian hoary bat activity apparently varies seasonally, but the nature and timing of this variation is unclear. Kepler and Scott (1990) noted that most observations of Hawaiian hoary bats occur from August through December. On Hawaii, 82 percent of observations occurred during this time, although the greatest sampling effort occurred from May through August (Kepler and Scott 1990).

Population estimates for all islands have ranged from hundreds to a few thousand. However, these estimates are based on limited and incomplete data and the status of the population is unknown (USFWS 1998). Observation and specimen records do suggest, however, that these bats are now absent or no longer breeding in historically occupied ranges.

Habitat Description

Hawaiian hoary bats have been observed foraging in a variety of both open and more vegetatively cluttered habitats, including open fields near native or non-native vegetation, over the open ocean (in bays near shore), over lava flows, and at streams and ponds. They have been documented foraging from 1 m to over 150 m (3 ft to over 483 ft) above the ground or water (Fujioka and Gon 1988, Kepler and Scott 1990, Jacobs 1993 and 1994 (*In* USFWS 1998), Reynolds *et al.* 1997) and while it is not known whether they prefer to roost in native or non-native vegetation cover, they generally have multiple roost sites which are usually 5 m (16.4 ft) or higher (USFWS 1998).

Roosting has been documented in numerous tree species, including hala (*Pandanus tectorius*), kukui (*Aleurites moluccana*), pukiawe (*Styphelia tameiameia*), and Java plum (*Syzygium cumini*) (USFWS 1998).

Hawaiian hoary bats were found to be more common on the drier side of Hawaii, probably because the number of flying insects is higher and feeding is less disrupted by rain. During the day, these solitary bats roost in a variety of tree species and occasionally in rock crevices and buildings. Bats have rarely been recorded hanging from wire fences on Kauai and have once been seen leaving and entering caves and lava tubes on Hawaii (USFWS 1998)

Threats, Recovery Strategies and Conservation Measures

The Hawaiian hoary bat was listed as endangered on October 13, 1970, under the Endangered Species Conservation Act of 1969, and a recovery plan was prepared in 1998 (USFWS 1998). Critical habitat has not been designated for the Hawaiian hoary bat.

The major threats to Hawaiian hoary bats are assumed to be the same as those that threaten many bat species in general (USFWS 1998). Bats have the slowest reproductive rate and the longest life-span of all mammals of their size. Thus, any mortality of breeding-age adults, particularly females, would constrain the recovery of the subspecies. The primary factor limiting recovery may be habitat loss, primarily the availability of roosting sites. Suitable roosting habitat is particularly important to pregnant and lactating females and non-flying young. Other possible threats identified in the recovery plan that have not been investigated may include pesticides (directly or by impacts to prey), predation (by native hawks and non-

native feral cats), alteration of prey availability due to introduction of nonnative insects, and roost disturbance. Occasional instances are documented of Hawaiian hoary bats killed by collisions with vehicles and structures (Menard 2001), and North American hoary bats seem quite susceptible to such collisions.

The overall recovery strategy for the Hawaiian hoary bat is for research that can provide information on the subspecies' abundance and distribution, life history, and habitat associations. The currently available information is so limited that even the most basic management actions cannot be undertaken with any certainty of benefit. Therefore, the primary recovery goal is to conduct research essential to the conservation of the Hawaiian hoary bat. Research should focus on developing standardized survey and monitoring protocols for determining abundance and distribution, roosting habitat associations, basic life history biology, and food habits. Other recovery goals are to protect and manage current populations by identifying and managing threats, including protection of key roosting and foraging areas; conduct a public education program; evaluate progress towards recovery; and revise recovery criteria as necessary (USFWS 1998).

Project Area Habitat and Use

As described above, the 20 acre LAU site consists of a mix of native and non-native vegetation, is partially forested and is characterized by numerous openings/savanna's interspersed with closed canopy forest. Because of the diversity habitat conditions provided, including an abundance of forest edge, the site provides both foraging and roost habitat for the Hawaiian hoary bat.

Although no surveys have been conducted on the site, echolocation surveys were conducted immediately south of the lease in the Laupahoehoe Forest Reserve. The site was sampled for seven months (January, March, April, June, August, October of 2007 and January 2008) (USGS 2007). Results from these surveys indicate that the highest bat activity occurred during the reproductive season (June, August and October), with lower levels of use in April and January. So although use appears to decline during the winter months, when bats may be found at greater densities at upper elevations (USGS 2007), it appears that site may be utilized for roosting/foraging by the Hawaiian hoary bat year-round.

Hawaiian Hawk ('io)

Species Distribution and Life History

The Hawaiian hawk or 'io is a small, broad-winged hawk endemic to the Hawaiian islands. While there is historic documentation of 'io on the islands of Kauai, Oahu and Maui, the 'io is only known to breed on Hawaii. This species is widely distributed on the island, being locally common on the slopes of Mauna Loa, on both the windward and Kona coasts, and to a lesser extent on Mauna Kea (USFWS 1984). It occurs from sea level to upper elevations (2,600 meters) and its current distribution is similar to its historic distribution (USFWS 1984, DOFAW 2005g).

Prior to the arrival of Polynesians, 'io may have exclusively preyed on birds, however its diet now includes non-native insects, birds and rodents, as well as native insects and birds. Limited data indicates individuals form long-term pair bonds and defend territories year-round. Nest construction begins up to two months prior to egg laying and continues through the nestling period. Base on recent studies, clutch size is nearly always one, although historically clutches of two and three were reported. Both adults feed nestlings, which are dependent on adults for up to nine months (DOFAW 2005g).

Habitat Description

‘Io occurs in lowland non-native forests, urban areas, agricultural lands, pasturelands and high elevation native forests with both intact and degraded understory. The wide range of nest site characteristics makes it difficult to describe a “typical ‘io nest. Although ‘io nests have been located in a number of non-native trees including eucalyptus (*Eucalyptus* spp), ironwood (*Casuarina equisetifolia*), mango (*Mangifera indica*), coconut palm (*Cocos nucifera*, and macadamia (*Casuarina equisetifolia*), of the 51 nests documented, 86 percent occur in ‘ohi’a (DOFAW 2005g).

During winter, ‘io have been reported in subalpine mamane-naio forest (*Sophora chrysophylla-Myoporum sandwicense*), suggesting seasonal movements. Because of the species’ use of a wide variety of habitats and lacks of historical population data, key habitat variables are difficult to determine (DOFAW 2005g).

Threats

‘Io are likely susceptible to the same factors that threaten other native Hawaiian birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For ‘io populations the following threats are of particular concern (DOFAW 2005g);

- 1) Harassment and Shooting – harassment of nesting birds and shooting may be the most significant factors directly affecting the ‘io today.
- 2) Habitat destruction and alteration – While the extensive destruction of native forests and destruction and alteration of both forest and lowland habitat has probably reduced the quality of some ‘io habitat, it is difficult to assess this impact due to the lack of historical information on ‘io population sizes (USFWS 1984).
- 3) Contaminants or toxins – Although additional research is necessary, the presence of organophosphates used in agriculture and consumption of rat poisons with diphacinone, may pose minor threats to this species.
- 4) Predators - Several potential predators of the ‘io or their eggs have been introduced to Hawaii. These include the domestic cat, Polynesian rat (*Rattus exulans*), black rat (*R. rattus*), Norway rat (*R. norvegicus*) and mongoose (*Herpestes auropunctatus*). While all predators may occasionally take a young bird, with the exception of the cat, it is unlikely that they pose a major threat to this species (USFWS 1984).

Conservation Measures

‘Io likely have benefited from management activities designed to conserve other endangered birds on the island of Hawai’i including fencing, ungulate and small mammal control, forest restoration and habitat monitoring. In addition to these efforts, future actions specific to the protection of ‘io populations may include the following (DOFAW 2005g):

- 1) Protection and management of foraging and nesting habitat, including native and non-native forests.
- 2) Enforcement of laws prohibiting the harassment, shooting, or trapping of the species.
- 3) Monitoring and Research – Areas of emphasis include quantifying habitat characteristics of occupied and unoccupied habitat, documenting mortality from nest disturbance,

shooting and secondary poisoning, and conducting life history studies to quantify population structure, dispersal and nest phenology.

Project Habitat

Due to the diversity of habitat conditions that exist in and around the project area including both native and non-native forests and woodlands, openings and agriculture, the entire lease and road corridor provides potentially suitable nesting and foraging habitat. Additionally the presence of 'io have been documented at numerous locations within 3 miles of the lease (USFWS 2008), as well as along the MH road corridor (UH 2008). As a result the site is considered suitable occupied 'io habitat.

Hawaiian Crow ('alalā)

Species Distribution and Life History

'Alala, is listed as endangered without critical habitat. Historically 'alala inhabited a mid-elevation (300 to 2,500 meters) belt of forests along the slopes of the Hualai and Mauna Loa volcanoes. Suitable habitat included native dry woodlands, and mesic 'Çhi'a (*Metrosideros polymorpha* and 'Çhi'a-koa (*Acacia koa*). There currently are no individuals known to exist in the wild. As of 2003, there are 40 'alala, representing the entire population of the species in captivity at the Keauhou and Maui Bird Conservation Centers on Hawai'i and Maui islands, respectively (USFWS 2003).

Like many corvids, 'alalā are long-lived and have a life span of 20 or more years. The species' diet primarily consists of native and introduced fruits, invertebrates, and eggs and nestlings of other forest birds, as well as nectar, flowers and carrion. Seasonal movements in response to weather and the availability of food plants (e.g. *Freycinetia arborea*) have been noted (USFWS 2003).

Nests are predominantly constructed in 'ōhi'a (*Metrosideros polymorpha*) trees. Clutch size ranges from two to five, although usually only one or two nestlings fledge. Fledglings typically cannot fly and often remain near the ground for long periods, likely increasing their susceptibility to disease (i.e., toxoplasmosis) and predation. Juveniles depend on their parents for at least eight months and remain with their family group until the following breeding season (USFWS 2003).

Habitat Description

Historically, 'alalā occupied dry and seasonally wet 'ōhi'a and 'ōhi'a/koa (*Acacia koa*) forests between 300 and 2,500 meters (1,000 – 8,200 feet) elevation. In addition, a significant amount of protective understory cover appears to be important to 'Alala in avoiding predation by 'io (USFWS 2003). 'Alala feeds on native and introduced fruits, invertebrates gleaned from tree bark and other sites, and eggs and nestlings of other forest birds. Nectar, flowers, and carrion are minor diet components. Because the last wild individuals were confined to a small subset of the species' former range, specific knowledge of key habitat requirements are unknown (USFWS 2003).

Currently all potential habitat is degraded. The presence of non-native mammalian predators and birds, which can act as disease reservoirs, further reduces habitat quality. Core areas of the species' former range are now managed by the State of Hawai'i and the USFWS (DOFAW 2005h).

Threats

Alalā are likely susceptible to the same factors that threaten other native Hawaiian forest birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For ‘alalā populations, the following are of particular concern (DOFAW 2005h):

- 1) Predation - Predation by non-native predators and native raptors (‘io (*Buteo solitarius*) and presumably pueo (*Asio flammeus sandwichensis*).
- 2) Shooting - Many ‘alalā were killed around farms between 1890 and 1930. Despite legal protection in 1931, shooting of individuals occurred into the 1980s.
- 3) Disease - Population declines early in the century were attributed to mosquito-borne diseases. Seasonal movement may have increased exposure to diseases. In addition, ‘alalā are susceptible to toxoplasmosis, a condition caused by a protozoan (*Tosoplasma gondii*) carried by feral cats.
- 4) Habitat degradation - Habitat conversion by human activity as well as by grazing ungulates has severely degraded former ‘alalā habitat. These changes may have limited food or nesting resources and may have increased the vulnerability of ‘alalā to predation by ‘io. Currently, little suitable habitat exists for the species.

Conservation Measures

The ‘alalā has been legally protected by the State of Hawai‘i since 1931 and was listed as federally endangered in 1967. A captive propagation program was established in 1973. Although there has been some success in breeding ‘alalā, it generally does not breed well in captivity. Between 1993 and 1998, 27 captive raised juvenile ‘alalā were released. Of these, 21 died in the wild and six were recaptured and returned to the captive flock. In 1999, the Kona Forest Unit of Hakalau Forest National Wildlife Refuge was acquired, with the goal of restoring habitat in the core of the species’ (DOFAW 2005h).

Project Area Habitat

Decades of overgrazing have greatly reduced suitable ‘alalā habitat in on the lease and in the surrounding agricultural areas. As a result it is unlikely these areas would provide suitable nest habitat. However because the HETF experimental unit immediately to the south of the lease may provide suitable nest habitat, the project area is considered suitable unoccupied ‘alalā foraging habitat.

Hawaiian Duck (Koloa Maoli)

Species Distribution and Life History

The koloa maoli, or Hawaiian duck, is one of two extant native duck species (Family: *Anatidae*) found in Hawai‘i and is closely related to the well-known, but non-native mallard (*A. platyrhynchos*). Koloa maoli are generally found in wetland habitats from sea level to 3,000 meters (9,900 feet) and populations on all islands except for Kaua‘i originated from re-introduced birds (DOFAW 2005d). Hawaiian ducks were re-established the island of Hawai‘i between 1976 and 1982, when captive-bred birds were released in the Kohala Mountains. Some birds have dispersed from release sites and have been recorded up to 32 kilometers (20 miles) away. They have been observed using stock ponds in the Kohala Mountains, stream habitats of Pololā,

Waimanu, and Waipio Valleys, and on Mauna Kea in stock ponds and larger montane streams (DOFAW 2005d).

Hawaiian ducks breed year-round, but the majority of nesting records are from March through June (USFWS 2005), with pairs dispersing to montane nesting localities. Koloa maoli forage in a wide variety of freshwater habitats, including artificial wetlands. The species typically forages in shallow water (less than 13 centimeters or five inches deep). Like mallards, koloa maoli are opportunistic and their diet includes snails, dragonfly larvae, earthworms, grass seeds, green algae, and seeds/leaf parts of wetland plants (DOFAW 2005d).

Nests are usually on the ground near water, but few nests are found in areas frequented by humans or areas supporting populations of mammalian predators. Generally eight to ten eggs are laid, and chicks are believed to hatch within 30 days (DOFAW 2005d).

Habitat Description

Koloa maoli occur in a wide variety of natural and artificial wetland habitats including freshwater marshes, flooded grasslands, coastal ponds, streams, montane pools, forest swamplands, taro, lotus, shrimp, and fish ponds, irrigation ditches, reservoirs, lowland wetlands and mouths of larger streams. Some important habitats are located in National Wildlife Refuges or on State lands, however other habitats including wetlands facing development or those used for agriculture or aquaculture are also important (DOFAW 2005d).

A typical stream used by the Hawaiian duck on the Big Island is 7 meters (23 feet) wide, swiftly flowing, strewn with boulders, and has heavily vegetated banks. However little information is available on habitat use of upland stream systems by this species. Ephemeral wetlands are important habitat for the Hawaiian duck, although how they are used beyond foraging is unknown (USFWS 2005).

Threats

Currently the most important threat to koloa maoli populations is hybridization with non-native mallards. In addition, feral pigs (*Sus scrofa*) and goats (*Capra hircus*) significantly reduce the suitability of nesting habitat along montane streams. Similar to the rest of native waterbirds, koloa maoli are also threatened by the following (DOFAW 2005d):

Habitat loss – In the last 110 years, approximately 31 percent of coastal plain wetlands have been lost. Also a shift from wetland agriculture to other agricultural crops and wetland modification associated with flood control and municipal watersheds has reduced available habitat (DOFAW 2005).

Introduced predators – Koloa maoli eggs and ducklings are particularly vulnerable to a variety of non-native mammals and birds, as well as some native species (auku‘u or black crowned night herons, *Nycticorax nycticorax hoactli*).

Non-native Invasive Plants - Several species of invasive plants, including pickleweed (*Batis maritima*), water hyacinth (*Eichornia crassipes*), and mangrove (*Rhizophora mangle*) reduce open water, mudflats, or shallows.

Avian diseases - The most important disease affecting Hawaiian waterbirds is botulism (*Clostridium botulinum*).

Conservation Action

The goals of conservation actions are not only to protect current populations and key breeding habitats, but also to establish additional populations, thereby reducing the risk of extinction. Specific actions include (DOFAW 2005d);

- 1) Continue restoration of important habitats.
- 2) Eliminate mallards and evaluate elimination of mallard/koloa maoli hybrids.
- 3) Conduct education and awareness programs, particularly to address issues of predation by dogs and feral cats.

Project Area Habitat

Potentially suitable koloa maoli habitat is found in two locations including a small 1/10 acre pond in the northwest portion of the lease (See figure 3 in Appendix A) and along the Kapili stream, which is crossed by the MH road in one location (See Figure 5 in Appendix A). Most of Kapili stream crosses through lands that have been altered for decades by agriculture, sugar cane cultivation and grazing and due to its small size and intermittent nature, would not provide preferred habitat conditions. Suitable foraging/stopover habitat occurs in the small pond in the northeast section of the lease, as well as in several small ponds on private land within 1 mile of the lease. The closest documentation of koloa maoli is approximately 1 mile south of the site in the Laupahoehoe Natural Area Reserve (USFWS 2008) and the project area is considered suitable unoccupied habitat for this species.

Hawaiian goose (Nēnē)

Species Status, Distribution and Life History

Nēnē is a State and Federal Endangered species. Current population is estimated at between 1,300 and 1,500 individuals with 378 birds on the island of Hawai‘i. All populations have been or are currently being supplemented by captive-bred birds. Nēnē occur between sea level and 2,500 meters (USFWS 2004) elevation on the island of Hawai‘i, Maui, Kaua‘i, and Moloka‘i. Historically this species was found on all islands and likely were widespread (DOFAW 2005f)

Nēnē graze and browse on the leaves, seeds, flowers, and fruits of at least 50 native and non-native grasses, sedges, composites, and shrubs. Composition of diet varies with location and habitat, and the species may require a diverse suite of food plants. Currently, several species of non-native grass are important in high-elevation habitats. Nēnē disperse seeds and therefore play an important ecological role, especially in influencing the species composition of early successional plant communities. Historically, flocks moved between high-elevation feeding habitats to lowland nesting areas (DOFAW 2005f).

Nēnē have an extended breeding season and eggs can be found in all months except May, June, and July, although the majority of birds nest between October and March, and most clutches are laid between October and December. Nēnē nests consist of a shallow scrape, moderately lined with plant materials and down. Pairs typically return to previous years' nests sites, typically in dense vegetation; when available, kīpuka may be preferred. Females lay between two and five eggs which hatch after 30 days (DOFAW 2005f).

Habitat Description

Nēnē historically occurred in lowland dry forest, shrubland, grassland, and montane dry forest and shrubland. Habitat preferences of contemporary populations are likely biased as preferences may be influenced by the location of release sites of captive-bred birds. Birds currently use a wide variety of habitats including coastal dune vegetation and non-native grasslands (e.g., golf courses, pastures, rural areas), sparsely vegetated low and high elevation lava flows, mid-elevation native and non-native shrubland, early successional cinderfall, cinder deserts, native alpine grasslands and shrublands, and open native and non-native alpine shrubland-woodland community interfaces. On the island of Hawai‘i, nēnē can be found from sea level to 2,400 meters (7,900 feet) elevation.

On the island of Hawai‘i and Maui, most nests are built under native vegetation such as pūkiawe (*Styphelia tameiameia*), ‘a‘ali‘I (*Dondonaea viscosa*), and ‘ōhi‘a (*Metrosideros polymorpha*). On Kaua‘i however, most nesting areas are dominated by non-native species and nēnē often nest under Christmas berry (*Schinus terebinthifolius*), shrub verbena (*Lantana camara*), and ironwood (*Casuarina spp.*). The condition of habitats occupied by nēnē varies considerably and many of the areas used by the species are managed by the State of Hawai‘i and the (USFWS 2004, DOFAW 2005f).

Threats

Historical threats included habitat loss and degradation, hunting, and predation by rats, cats, and dogs (*Canis domesticus*), and the small Indian mongoose (*Herpestes auro-punctatus*). Current threats include predation by the above suite of non-native mammals, exposure in high-elevation habitats, nutritional deficiency due to habitat degradation which may result in low productivity, a lack of lowland habitat, human-caused disturbance and mortality (e.g., road mortality, disturbance by hikers), behavioral problems related to captive propagation, and inbreeding depression (DOFAW 2005f).

Conservation Action

The goals of conservation actions are not only to protect current populations and key breeding habitats, but also to establish additional populations, thereby reducing the risk of extinction. Specific management directed toward nēnē include (DOFAW 2005f):

- Identify and protect all habitats used by nēnē including foraging habitat, breeding grounds, and summer flocking areas.
- Increase predator control effort and effectiveness and habitat enhancement and restoration efforts, especially in native grasslands and shrublands.
- Prevent the introduction of the small Indian mongoose on Kaua‘i and the establishment of other potential predators on all islands.
- Develop standardized monitoring protocols. Minimize the potential for human-nēnē interactions or conflicts through increased public education.
- Develop a statewide, long-range management plan for all populations.

Project Area Habitat

The project area is outside the current range of this species (USFWS 2004). Although there has been no recent documentation of this species in or near the lease (USFWS 2008, UH 2008), the site does provide the mid-elevation shrub habitat utilized by this species (USFWS 2004). As a result the project area is considered suitable unoccupied nēnē habitat.

Hawai'i Creeper

Species Status, Distribution and Life History

The Hawai'i creeper is federally and state listed as endangered. The Hawaiian Forest Bird Survey (1976-79, 1983), estimated the Hawai'i creeper population at 12,500 ± 2,000 (95% CI) individuals. The largest population consisted of 10,000 ± 1,200 birds (DOFAW 20051).

Historically Hawai'i creepers occurred across the island of Hawaii above 1,070 meters (3,500 feet) elevation. Currently they occur in four disjunct populations above 1,500 meters (5,000 feet) on the windward side of the island (DOFAW 20051).

The Hawai'i creeper most frequently gleans insects, spiders, and other invertebrates from the branches, trunks, and foliage of live 'ōhi'a and koa trees. During the breeding season the species' home range averages four to seven hectares (10 – 17 acres) and a 10 – 20 meter (33 – 66 feet) territory around the nest is defended. Most nests are open cup structures, but about 15 percent are placed in cavities or in bark crevices. Hawai'i creepers re-nest after nest failures and pairs have been documented raising two broods in a season. Nest success of Hawai'i creepers is very low, but adults have high annual survival. Outside the breeding season, the species frequently joins mixed-species foraging flocks and forages over home ranges that average 11 hectares (17.3 acres) (DOFAW 20051).

Habitat Description

Hawai'i creeper occur most commonly in mesic and wet forests dominated by 'ōhi'a and koa, with a subcanopy of 'ōlapa (*Cheirodendron trigynum*), pūkiawe (*Styphelia tameiameia*), 'ōhelo (*Vaccinium spp.*), 'akala (*Rubus hawaiiensis*), kōlea (*Myrsine spp.*), kāwa'u (*Ilex anomala*), and hapu'u tree ferns (*Cibotium spp.*). Habitat conditions vary across the species' range, with much of the habitat degraded by grazing ungulates, especially feral pigs. Most of the current range of the Hawai'i creeper is within the boundaries of State and Federally owned lands (DOFAW 20051).

Threats

Hawai'i creepers are likely susceptible to the same factors that threaten other native Hawaiian forest birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For Hawai'i creeper populations, the following are of particular concern (DOFAW 20051):

- Predation - Nest success of Hawai'i creepers is very low (11 to 50 percent) and rat predation may be partially responsible. Hawai'i creepers place their nests near the main trunks of trees which may facilitate predation by rats.
- Disease - The Hawai'i creeper's absence from habitats below 1,350 meters (4,500 feet) elevation suggests that it may be particularly susceptible to mosquito-borne avian disease.

- Habitat loss and degradation - Logging and grazing ungulates has reduced, degraded, and fragmented suitable forest habitats. Habitat fragmentation may be a dispersal barrier preventing or restricting natural re-colonization of the species' former range.
- Competition - It has been suggested that competition with Japanese white-eyes (*Zosterops japonicus*) may negatively affect Hawai'i creepers.

Conservation Action

Hawai'i creepers have likely benefited from management activities designed to conserve other endangered forest birds including fencing, ungulate and small mammal control, forest restoration, habitat monitoring, and studies of disease and disease vectors. In addition to these efforts, future management specific to the Hawai'i creepers may include the following (DOFAW 2005I):

- Re-introduce the Hawai'i creeper to managed areas in their former range (e.g., Mauna Loa strip in Hawai'i Volcanoes National Park).
- Rodent control may enhance nestling and female survival. Aerial broadcast of rodenticides would be the most effective method to treat broad areas.
- Increase public education efforts to engender support for conservation of forest birds.
- Continue protection and management of wildlife sanctuaries and refuges.

Project Area Habitat

Although the Hawaii creeper has not been documented in the lease (USFWS 2008, UH 2008), it has been documented from within the HETF experimental unit (USFWS 2008, NAR 2007, UH 2008) and one site on private land approximately 0.75 miles northeast of the project area. Also although non-native forest predominates, portions of the lease contain suitable closed canopy native forest and the project area is considered suitable unoccupied Hawaii creeper habitat.

Newell' Shearwater ('A'o) and Hawaiian Petrel ('Ua'u)

These species have similar habitat, threats and conservation actions. As a result they will be discussed together.

Species Status, Distribution and Life History

'A'o

Newell' shearwater or 'a'o is federally and state listed as threatened. 'A'o was once abundant on all main Hawaiian islands. From at-sea counts conducted in 1994, the total population of the Newell's shearwater was estimated at roughly 84,000 birds. Recent radar target data (Day *et al.* 2003), however, from 1993 to 1999-2001 indicate the population may have declined approximately 60 percent from those estimates. The current breeding population size is estimated to be 14,600 pairs (DOFAW 2005b) with approximately 75 percent occurring on the island of Kauai.

Most of the life history information for this species is based on studies of the Kauai population and life histories of birds in the Hawaii population, if one exists, may differ slightly. The following is a summary of information from the Kauai population. During their nine month breeding season from April through November, Newell's shearwaters live colonially in 16

burrows under ferns on forested mountain slopes. These burrows are used year after year and usually by the same pair of birds. A single egg is laid probably in June. Incubation by both sexes lasts 45 days, and young fledge in October-November. The Newell's shearwater needs an open downhill flight path through which it can become airborne and favors ridge crests and embankments for its nesting burrows (USFWS 1983).

Daily flight to and from colonies occurs only at night. On, Kauai, Newell's shearwaters begin to arrive at colonies well after sunset and just before the sky becomes completely dark (Cooper and Day 1995). After 30 minutes past sunset, markedly fewer birds arrive, although some continue to arrive throughout the night. In the morning, departure is even more synchronous and centered about 15 minutes on either side of a completely dark sky. Flight speed over land in Hawaii, without correction for wind direction and speed, has been estimated at 16.8 m/s \pm 1.9 (38 miles per hour \pm 4 SD; Reynolds *et al.* 1997, measured by radar).

'Ua'u

The Hawaiian petrel or 'Ua'u is federally and state listed as endangered. The species was once abundant on all main Hawaiian islands except Niihau. Today, Hawaiian petrels breed in high-elevation colonies, primarily on East Maui and, although there is also a small colony on Mauna Loa, on the Big Island of Hawaii (DOFAW 2005b).

'Ua'u is primarily a nocturnal flying over land, and active in their nest colony for about nine months each year (activity at the nesting colony is diurnal and nocturnal). The long lived adults (ca. 30 years) return to the same nesting burrows each year between March and April. Females lay only one egg, which is incubated alternately by both parents for approximately 55 days. Eggs hatch in July or August, after which both adults spend their time flying to sea to feed and bring food home for the nestling. Adult birds do not breed until age six and may not breed every year. However, pre-breeding and non-breeding birds return to the colony each year to socialize. It is estimated that 89 percent of the adult population breed each year (DOFAW 2005b).

'Ua'u use their nesting habitat between March and November each year and apparently have a nesting cycle similar to that of the 'a'o, although slightly earlier (USFWS 1983). The burrows of the 'a'o and 'ua'u are used year after year, generally by the same pair. If damaged, they are sometimes re-excavated or abandoned for new sites.

On the islands of Hawai'i and Maui, populations are at the limits of their habitat in the cold, xeric environment above 2,500 m (8,200 ft) in national parks (DOFAW 2005b).

Habitat Description

'A'o

Nesting habitat is by far the most fragile element of the life needs of 'A'o since it is used for over nine months of the year (USFWS 1983). Existing 'a'o nest sites are typically within steep mountainous terrain between 1650 meters and 7,600 meters in elevation. Uluhe fern is nearly always associated with its nesting areas, although some nests may occur outside of but near it. The affinity of the 'a'o for the dense fern habitat is likely an adaptation for protection from predators, but may also be chosen for its protection from the elements and to stabilize the burrows against soil erosion. Tree cover is moderate to light, the roots of which serve to shore up burrow entrances and discourage pig digging (USFWS 1983).

It is likely the distribution and abundance of a food supply largely determines the distribution of seabirds. Small fish, crustaceans and squid are known to be utilized by both species.

‘Ua’u

Hawaiian petrels are colonial and nest in burrows, crevices in lava, or under ferns. The burrows are generally 1 to 2 m (3 to 6 ft) long (from entrance to nest chamber), although some may be as long as 9 m (30 ft) (Simons e). On Hawaii and Maui, nest in the cold, xeric environment above 2,500 m (8,200 ft) occur primarily in national parks. On Kauai, there is evidence that Hawaiian petrel nest at lower elevations in densely vegetated rainy environments (DOFAW 2005b). On Lanai, Hawaiian petrels nest in burrows under dense uluhe ferns.

The ‘ua’u is currently known to nest only at elevations above 2,100 meters (7,200 feet). In these dry areas, vegetation in nesting areas is predominately grass, (*Deschampsia australis*) and bracken fern (*Pteridium aquilinum*). Pukiawe (*Styphelia tameiameia*) dominates in moist habitat sites. ‘Ua’u nesting burrows are commonly located among large rock outcrops, talus slopes or along edges of lava flows with suitable underlying soil for the excavation of tunnels. Although historically nesting colonies occurred at lower elevation, these have since become completely devastated by predators (USFWS 1983).

They feed by dipping, pattering, and surface seizing/scavenging of tuna or similar subsurface predators. Squid make-up the majority of their diet with fish (e.g. goatfish and lantern fish) and crustaceans supplementing.

‘A’o and ‘Ua’u

A second type of habitat that is critical to both the ‘a’o and ‘ua’u is transitory habitat, or the land area which is traversed by nesting adults and fledglings while flying between their nesting grounds and the ocean. Although the amount of time spent by the birds in this zone is very limited, all the rest of the reproductive effort could be lost if these corridors were not available. These corridors must be free of bright lights, particularly on dark nights. High intensity lights that produce an upward glare seem to have the greatest attraction to ‘a’o fledglings. The ‘ua’u may also require a dark transitory zone between its nesting grounds and the ocean, but it has not been noted as a major problem for this species.

Threats

‘A’o and ‘Ua’u

During the last 150 years, 75 percent of the forests on the main islands of the Hawaiian archipelago have been converted to agricultural, military, commercial or residential land uses, leading to a depletion of available nesting habitat for these species. The introductions of the mongoose, black rat, and Norway rat (*Rattus norvegicus*) have also played a primary role in the reduction of ground-nesting seabirds. Predation by feral cats and barn owls has been observed. In addition, feral pigs are known to collapse burrows as well as prey upon shearwater (DOFAW 2005b).

Although ‘a’o are much more susceptible, both species can be adversely affected by artificial lighting. Street and resort lights, especially in coastal regions, disorient fledglings causing them to eventually fall to the ground exhausted or increase their chance of colliding with an artificial structure (i.e., fallout). Once on the ground, fledglings are unable to fly and thousands are killed annually by cars, cats, and dogs or die because of starvation or dehydration. Because transitory

habitat includes use of traditional flight corridors, power lines that cross these corridors can kill both adults and fledglings (DOFAW 2005b).

‘A’o

- Over fishing - Because ‘a’o) rely on predatory fish to drive prey to the surface, over fishing may eventually affect Hawaiian populations. The effect on the breeding populations is unknown, but may result in adults expending more energy to provision chicks.
- Disease - ‘A’o fledglings have been found with pox lesions, suggesting that disease also may be affecting breeding populations.
- Colony locations - Remoteness of colonies, as well as the habitat they occur in (e.g. steep terrain or dense forest) complicates predator and ungulate eradication or control.
- Catastrophes - Given that a large proportion of the population breeds on Kaua‘i, catastrophic events, like hurricanes, threaten this species.

Conservation Actions

‘A’o and ‘Ua’u

The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize by catch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to reestablish former breeding colonies thereby reducing the risk of extinction. Specific actions include (DOFAW 2005b):

- Identify potential habitat for re-population
- Eradicate and/or control invasive plants from current colony sites and from potential sites.
- Continue to control mammalian predators and ungulates.
- Develop monitoring programs
- Maintain a program to shield lights and continue to identify fallout areas and work to minimize effects of power lines and artificial lights.
- Continue with existing outreach programs (e.g. Save our shearwater program) and development partnerships with private landowners to assist conservation measures.

Project Area Habitat

‘A’o and ‘Ua’u

There has been no documentation of either the ‘A’o or ‘ua’u in or near the lease and the project area does not provide suitable breeding habitat. However because the lease site lies between suitable nest habitat on Manua koa and foraging habitat, it may be utilized as transitory habitat

and the proposed wind turbine/tower (Alternatives 2-4) and power lines (Alternatives 2-5) do have the potential to directly impact these species.

Hawaii Species of Greatest Need

Short-eared Owl (Pueo)

Species Distribution and Life History

Pueo is a state endemic species that is listed as endangered species on O’ahu. They are found on all the main Hawaiian islands from sea level to 2,450 meters (8,000 feet). Because of relatively few detections documented, the abundance of this species is largely unknown. Pueo were widespread at the end of the 19th century, but are thought to be declining (DOFAW 2005e).

Unlike most owls, pueo are active during the day and are commonly seen hovering or soaring over open areas. Like short-eared owls in continental environments, those in Hawaii primarily consume small mammals. Their relatively recent establishment on Hawai’i may have been tied to rats that Polynesians brought to the islands. Little is known about the breeding biology of pueo, but nests have been found throughout the year and are comprised of simple scrapes in the ground lined with grasses and feather down. Young may fledge from the nest on foot before they are able to fly and depend on their parents for approximately two months (DOFAW 2005e).

Habitat Description

Pueo occupy a variety of habitats, including wet and dry forests, but are most common in open habitats such as grasslands, shrublands, and montane parklands, including urban areas and those actively managed for conservation. Because of a lack of historical population data and the species’ current, broad habitat use, key habitat variables are difficult to determine (DOFAW 2005e).

Threats

Pueo are likely susceptible to the same factors that threaten other native Hawaiian birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. However, their persistence in lowland, non-native and rangeland habitats suggests that they may be less vulnerable to extinction than other native birds, especially because they may be resistant to avian malaria (*Plasmodium relictum*) and avian pox (*Poxvirus avium*). Despite this, for pueo populations, the following are of particular concern (DOFAW 2005e):

- “Sick owl syndrome” - Mortality on Kaua’i has been attributed to this syndrome, which may be related to pesticide poisoning or food shortages.
- Predation - Because pueo nest on the ground, their eggs and young are vulnerable to predation by rats, cats, and the small Indian mongoose.
- Habitat loss - Although largely unknown, this may be particularly important to O’ahu pueo populations.
- Contaminants or toxins - Because pueo are top predators, fat-soluble contaminants may accumulate in prey species

- Human interaction. Hunting behavior and habitat use predispose pueo to vehicular collisions, which have been documented on Lāna‘i and the island of Hawai‘i.

Conservation Actions

Pueo likely have benefited from management activities designed to conserve other endangered birds. They also may benefit from game bird management; high densities of pueo occur on lands where game birds also are common. In addition to these efforts, future management specific to the pueo may include the following (DOFAW 2005e):

- Determine population trends, especially on islands where “sick owl syndrome” has been documented.
- Public outreach and education.
- Continue protection and management of wildlife sanctuaries and refuges.

Project Area Habitat

Although this species has not been documented on the lease or along the MH road corridor (UH 2008), suitable open habitat exists and the project area is considered suitable unoccupied pueo habitat.

Hawaii ‘Elepaio

Species Distribution and Life History

The Hawai‘i elapaio is a small adaptable monarch flycatcher (Family: Monarchiade) endemic to the island of Hawai‘i at the subspecies level. ‘Elepaio also occur on Kaua‘i (*C. s. sclateri*) and O‘ahu (*C. s. ibidis*); the latter subspecies is federally listed as endangered. They occur in most forested areas above 600 meters (2,000 feet) in elevation. Isolated populations occur in Kohala and on the western slope of Mauna Kea. Original distribution likely included all forested areas of the island. The island of Hawai‘i is home to one population (63,000) of *C. s. sandwichensis*, with the highest densities of birds occurring between and 1,300 and 1,900 meters (4,500 to 6,500 feet) in elevation (DOFAW 2005i).

‘Elepaio use virtually all available substrates for foraging including the air, ground, logs, rock crevices, snags, and all parts of trees. Equally diverse in the use of foraging maneuvers, ‘elepaio capture a wide range of arthropod prey by flycatching, gleaning while perched or hovering, and direct pursuit; foraging maneuvers vary depending on plant species from which prey is being captured and habitat type. The Hawai‘i ‘elepaio may prefer ‘ōhi‘a (*Metrodiseros polymorpha*) and kāwa‘u (*Ilex anomola*) for foraging (DOFAW 2005). Finely woven cup nests are built in ‘ōhi‘a and in other trees in proportion to their availability. Young remain on their natal territory for up to ten months (DOFAW 2005i).

Habitat Description

Hawai‘i ‘elepaio populations occur in a variety of forest types and across a range of elevations, but are most common in wet or mesic forests at higher elevations. Highest densities occur in ‘ōhi‘a or mixed ‘ōhi‘a-koa forests above 1,100 meters (3,600 feet). Much of the current range of the Hawai‘i ‘elepaio is managed for conservation by State and Federal agencies or private conservation partnerships (DOFAW 2005i).

Threats

Hawai'i 'elepaio are likely susceptible to the same factors that threaten other native Hawaiian forest birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For Hawai'i 'elepaio populations, the following are of particular concern (DOFAW 2005i):

- Predation, particularly by black rats and rat control in populations of this species, have resulted in large increases in nest success.
- Disease such as the avian pox is known to reduce both nesting success and adult survival.
- Habitat loss and degradation, especially at low elevations is considered a major cause of declines.

Conservation Action

Hawai'i 'elepaio likely have benefited from management activities designed to conserve other endangered forest birds species including (DOFAW 2005i):

- Protection and restoration of high elevation native forests, including the elimination of feral ungulates and non-native invasive plant species.
- Public education and outreach about the importance and benefits of rodent control.
- Continue protection and management of wildlife sanctuaries and refuges.

Project Area Habitat

Although this species was not documented on the lease during the 2008 survey (UH 2008), it has been documented near the site in the HETF experimental unit (NAR 2008). As a result and considering suitable forest habitat exists on the site, it is likely that the project area is utilized for foraging and possibly nesting.

Hawaii Thrush ('Oma'o)

Species Distribution and Life History

One of five species of Hawaiian solitaires (family: Turdidae), the 'ōma'ō is endemic to the island of Hawai'i. 'Ōma'ō primarily occur in two populations on the eastern and southern slopes of the island of Hawai'i at elevations greater than 1,000 meters (3,300 feet). A third, smaller population occurs in alpine scrub habitat between 2,000 and 3,000 meters (6,500 – 9,750 feet) elevation. Currently, 'ōma'ō occupy an estimated 30 percent of their former range, which historically included habitats from 300 – 3,000 meters (1,000 – 9,750 feet) in elevation. Bird Surveys (1976-79, 1983) estimated the population at 170,000 individuals. Based on more recent surveys, the populations appear stable, and may be increasing in habitats below 1,200 meters (3,450 feet) (DOFAW 2005j).

The life history of this species is well-studied. Their diet consists primarily of fruits of native and introduced understory plant species, although they also take koa flowers from the canopy and prey on a variety of invertebrates, including earthworms, snails, spiders, and insects. Both sexes defend small nesting territories. Nests are built by females in a variety of locations (e.g., cavities, trunk forks); females also perform most incubation and brooding. Clutch size is one or two eggs,

and double brooding occurs. Fledglings remain in their natal territories for four to six months after fledging (DOFAW 2005j).

Habitat Description

‘Ōma‘o occur in mesic and wet montane ‘ōhi‘a (*Metrosideros polymorpha*) or mixed ‘ōhi‘a and koa forests in the Hāmākua, Ka‘ū, and Kīlauea districts. These forests support a variety of important food plants, including ‘ōlapa (*Cheirodendron trigynum*), kōlea (*Myrsine lessertiana*), kāwa‘u (*Ilex anomala*), naio (*Myoporum sandwicense*), pilo (*Coprosma* spp.), pūkiawe (*Styphelia tameiameia*), ‘ōhelo (*Vaccinium* spp.), and ‘ākala (*Rubus hawaiiensis*). In the small alpine scrub population on Mauna Loa, pūkiawe, ‘ōhelo, kūkaenēnē (*Coprosma ernodeoides*), and ‘a‘ali‘i (*Dodonea viscosa*) are important food plants. Although most of the species’ current range occurs on State and Federal lands, the condition of ‘ōma‘o habitat varies considerably (DOFAW 2005j).

Threats

‘Ōma‘o are likely susceptible to the same factors that threaten other native Hawaiian forest birds, including: loss and degradation of habitat, predation by introduced mammals, and disease. For ‘ōma‘o populations, the following are of particular concern (DOFAW 2005j):

- Disease - The prevalence of disease in areas tested is low and five ‘ōma‘o exposed to malaria recovered quickly, suggesting a greater resistance to disease compared to other native forest birds. However, the disappearance of populations from lower elevations has been the pattern of decline noted in other Hawaiian birds susceptible to mosquito borne diseases.
- Predation - ‘Ōma‘o nests are very accessible and therefore vulnerable to predation by rats. Predation by native raptors also is likely.
- Habitat degradation - ‘Ōma‘o occur at lower densities in degraded habitat. Pigs and other ungulates likely destroy important food plants.

Conservation Actions

‘Ōma‘o likely have benefited from management efforts designed to conserve other endangered forest birds including (DOFAW 2005j):

- Protection and restoration of native forests above 1,500 meters (4,500 feet), including elimination of feral ungulates and non-native plants.
- Control or eradication of rats and feral cats in areas occupied by ‘ōma‘o.
- Public education and outreach and continued protection/management of wildlife sanctuaries and refuges.

Project Area Habitat

Although this species was not documented on the lease during the 2008 survey (UH 2008), it has been documented in the HETF experimental unit (NAR 2008). As a result and considering suitable forest habitat exists on the site, it is likely that the project area is utilized for foraging and possibly nesting.

‘Apapane

Species Distribution and Life History

The ‘apapane is a small, crimson, primarily nectarivorous Hawaiian honeycreeper (Family: Fringillidae) and is an important ‘ōhi‘a pollinator. ‘Apapane are the most abundant and widely distributed Hawaiian honeycreeper, and they are often seen flying above the canopy in search of patches of flowering ‘ōhi‘a. Historically, ‘apapane were common at low elevations on all islands with appropriate habitat, although ‘Apapane are more common in native forests above 1,250 meters (4,100 feet) (DOFAW 2005c).

The wide-ranging movements of ‘apapane may facilitate disease transmission among native forest birds. ‘Apapane often forage in conspecific flocks, likely to overwhelm ‘i‘iwi (*Vestiaria coccinea*) and ‘ākohekohe (*Palmeria dolei*), which often defend flower-rich trees. Outside the breeding season, ‘apapane also join mixed-species flocks. ‘Apapane also eat insects, which they glean from outer foliage and twigs in the upper- and mid-canopy. Pairs defend small territories around nests and fledglings may remain with their parents for up to four months (DOFAW 2005c).

Habitat Description

‘Apapane occur in mesic and wet forests dominated by ‘ōhi‘a and koa (*Acacia koa*), primarily at elevations greater than 1,250 meters (4,100 feet) elevation. The primary reason for this limitation is the high density of cold intolerant *Culex* mosquitoes, an important disease vector, below this elevation. Occupied habitats also support kōlea (*Myrsine lessertiana*), naio (*Myoporum sandwicense*), and hapu‘u tree ferns (*Cibotium spp.*). Māmane (*Sophora chrysophylla*) is common in high-elevation foraging habitat (DOFAW 2005c).

Threats

Although ‘apapane populations appear stable on the islands of Hawai‘i, Maui, and Kaua‘i, they are likely susceptible to the same factors that threaten other native Hawaiian forest birds including: loss and degradation of habitat, predation by introduced mammals, and disease. Disease is of particular concern for this species and of Hawaii’s native forest bird, ‘apapane have the highest prevalence of avian malaria (DOFAW 2005c).

Conservation Actions

Management efforts that have improved habitat for this species include fencing, ungulate and small mammal control, forest restoration, habitat monitoring, and studies of disease and disease vectors. In addition, mosquito control in degraded habitats, public education and outreach and habitat protection are considered conservation actions that benefit ‘apapane (DOFAW 2005c).

Project Area Habitat

This species has been documented on the HETF experimental unit (NAR 2008) as well as on the lease and along the MH road corridor (UH 2008). As a result and considering the availability of suitable foraging and nesting habitat, it is likely the project area is utilized for foraging and possibly nesting.

ʻiʻiwi

Species Distribution and Life History

The ʻiʻiwi is a state endemic that is one of the most beautiful of the extant Hawaiian honeycreepers (Family: Fringillidae). Historically, ʻiʻiwi were common at low elevations on all the Main Hawaiian Islands. ʻIʻiwi currently occur above 1,250 meters (4,100 feet) elevation on the islands of Hawaiʻi, Maui, and on Kauaʻi; they occur at reduced densities below 1,000 meters (3,300 feet) (DOFAW 2005m).

Like ʻapapane, ʻiʻiwi often fly long distances in search of flowering ʻōhiʻa trees and are important ʻōhiʻa pollinators. Their diet consists primarily of nectar taken from a variety of native and non-native flowers and the presence of non-native flowers may have contributed to increases in some populations. Both sexes defend small nesting territories and may defend important nectar resources. Nest sites are in terminal branches of ʻōhiʻa trees and both sexes build the open-cup nest. Despite their widespread distribution, little is known about their life history (DOFAW 2005m).

Habitat Description

ʻIʻiwi occupy mesic and wet forest dominated by ʻōhiʻa and koa. Loss and degradation of habitat and high densities of cold-intolerant *Culex* mosquitoes, an important disease vector in lowland areas restrict most birds to elevations above 1,250 meters (4,100 feet). Habitats with the highest ʻiʻiwi densities also support kōlea, naio, and hapuʻu tree ferns. Māmane is common in high-elevation foraging habitat (DOFAW 2005m).

Threats

Although ʻiʻiwi populations appear stable on the islands of Hawaiʻi, Maui, and Kauaʻi, they are likely susceptible to the same factors that threaten other native Hawaiian forest birds including: loss and degradation of habitat, predation by introduced mammals, and disease. This species is very susceptible to avian malaria and avian pox and this susceptibility likely explains their severe population declines (DOFAW 2005m).

Conservation Action

Management efforts that have improved habitat for this species include fencing, ungulate and small mammal control, forest restoration, habitat monitoring, and studies of disease and disease vectors. In addition, mosquito control in degraded habitats, public education and outreach and habitat protection are considered conservation actions that benefit ʻiʻiwi (DOFAW 2005m).

Project Area Habitat

This species has been documented on the HETF experimental unit (NAR 2008) as well as on the lease and along the MH road corridor (UH 2008). As a result and considering the availability of suitable foraging and nesting habitat, the project area is considered suitable occupied habitat for this species.

Hawaiʻi ʻAmakihi

Species Distribution and Life History

The Hawaiʻi ʻamakihi is a small, generalist Hawaiian honeycreeper (Family: Fringillidae) that occurs on the islands of Hawaiʻi, Maui, and Molokaʻi. They occur between 300 and 2,900 meters

(1,000-9,500 feet) and their original range likely included all forested regions of these islands, as well as those on Lana'i, where it was last seen in 1976 (DOFAW 2005k).

Hawai'i 'amakihi are generalized foragers that most often glean arthropods from the leaves, blossoms, twigs, branches, and less frequently from tree trunks of a variety of trees, ferns, and shrubs. Feeds on nectar predominately from the flowers of 'ōhi'a, māmane, and native lobelias (*Campanulaceae*), but also forages on flowers of a number of other native and non-native plants. Hawai'i 'amakihi also eats fruit from native and non-native plants, but predominately from pilo (*Coprosma spp.*). They forage alone, in pairs, in family groups, or in mixed flocks. The female builds an open-cup nest and lay two to three eggs. Pairs will remain together for successive breeding seasons and usually raise two broods/year (DOFAW 2005k).

Habitat Description

Hawai'i 'amakihi occupy a wide range of habitats on the islands of Hawai'i and Maui. These include native shrubland and dry, mesic, and wet forests in montane and subalpine communities. 'Amakihi densities are highest on the island of Hawai'i in subalpine 'ōhi'a scrub in Ka'ū, and in māmane/naio forests on Mauna Kea. 'Amakihi also are common in koa reforestation areas at higher elevations. On Maui, 'amakihi are common in subalpine dry communities dominated by 'ōhi'a, māmane, pūkiawe (*Styphelia tameiameia*) and 'a'ali'i (*Dodonea viscosa*). They also occupy some non-native tree plantations on Maui, although these are near areas where native vegetation persists (DOFAW 2005k).

Threats

Although Hawai'i 'amakihi populations appear stable they are likely susceptible to the same factors that threaten other native Hawaiian forest birds, including: loss and degradation of habitat, predation by introduced mammals, and disease (DOFAW 2005k).

Conservation Action

Management efforts that have improved habitat for this species include fencing, ungulate and small mammal control, forest restoration, habitat monitoring, and studies of disease and disease vectors. In addition, mosquito control in degraded habitats, public education and outreach and habitat protection are considered conservation actions that benefit Hawai'i 'amakihi (DOFAW 2005k).

Project Area Habitat

This species has been documented on the HETF experimental unit (NAR 2008) as well as on the lease and along the MH road corridor (UH 2008). As a result and considering the availability of suitable foraging and nesting habitat, the project area is considered suitable occupied habitat for this species.

Environmental Consequences

This section describes the effects of implementation of each of the alternatives identified above on wildlife and wildlife habitat. It is broken down into two sections including 1) a discussion of the effects on wildlife in general under each of the alternatives, and 2) alternative effects to each of the T&E and State species analyzed in detail (See Table 3).

Mitigation Measures

Mitigation measures include activities that occur during implementation that are designed to mitigate or reduce impacts to wildlife. Table 4 identifies specific mitigations related to wildlife and displays the target species or habitat. All anticipated effects described below are based on implementation of these mitigations, as well as other mitigation measures identified in the EA.

Table 4: Mitigation Measures to Reduce Impacts to Wildlife

Mitigation Measure	Project Design Feature	Target Species/Habitat
WL-1	In order to reduce potential disturbance to roosting bats, no tree removal will occur when lactating or non-volant bats are present (April 15 th through September 1st).	Hawaiian Hoary Bat
WL-2	In order to reduce potential impacts to bats, wind generators will not be operated during periods of bat activity (½ hour before sunset to ½ hour after sunrise).	
WL-3	In order to reduce potential impacts to foraging bats, only smooth wire will be used on the top of any fences constructed.	
WL-4	In order to reduce potential impacts to foraging bats and seabirds, no lights would be installed on wind turbine towers.	Hawaiian Hoary Bat and Seabirds.
WL-5	In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any wind turbine and tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.	Hawaiian Hoary Bat and resident and migratory birds.
WL-6	A nest survey of the site will be conducted prior to implementation. No activities would be permitted within 1,320 ft. of an active Hawaiian Hawk nest between April 1 st and August 15 th .	Hawaiian Hawk
WL-7	Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) that are designed to make all structures “avian safe”.	Hawaiian Hawk and resident and migratory birds.
WL-8	In order to eliminate the possibility that a nesting Hawaiian duck would be disturbed, a nest survey will be conducted prior to implementation of any activities that occur within suitable nest habitat.	Hawaiian Duck
WL-9	In order to ensure that mitigations are effective at reducing impacts, visual monitoring will be conducted along all fence lines and within 100 ft. of any wind tower for a period of three years. If injury or mortality to any Threatened or Endangered Species is documented, the USFWS will be contacted and appropriate mitigation measures implemented.	Threatened and Endangered Wildlife
Veg-1	Removal of native tree species will be minimized (@95% unaffected) and disturbed areas will be restored with native plant species.	Native Plants and Wildlife

Alternatives Analyzed

This report analyzes the effects of five alternatives. The following is a brief summary of the treatments proposed under each:

Alternative 1 (No Action) – under this alternative no facilities or road improvements would occur.

Alternative 2 (Proposed Action – Green Alternative)

- Facility Construction – Construct up to four housing units, one administrative unit, one 20 vehicle parking lot, rooftop water collection system, vehicle wash stations.
- Power – Power for the facilities would be supplied by extension of electrical lines from existing service adjacent to the MH Road. A total of approximately 2.5 miles of line would be installed. Most of this would occur as overhead lines and approximately 0.3 miles would be buried along the MH road Right-Of-Way (ROW).
- Alternative Green Energy – Solar panels and one wind turbine
- Fencing – Up to 3 acres of 4 to 6 ft. high fence.
- Roads – MH road resurfacing on up to 2.5 miles of road with no widening beyond the existing template. Repair low water crossing (Kapili Stream) by re-aligning road (up to 12 ft. for distance of 25 ft.)

Alternative 3 (overhead power and supplemental green energy)

- Facility Construction, alternate energy, fencing and road work the same as Alternative 2.
- Power – Similar to Alternative 2 except that all power to the site would be provided by above ground power lines.

Alternative 4 (Propane power and supplemental green energy).

- Facility Construction, alternate energy, fencing and road work the same as Alternative 2.
- Power – generated on-site using propane. Some above ground power lines on the facility site.

Alternative 5 (Same as Alternative 2 except no wind turbine)

- Facility Construction, fencing, power and road work are the same as Alternative 2. However under this alternative no wind turbine would be installed.

Alternative Effects to Wildlife

Direct and Indirect Effects

Alternative 1

Direct Effects

Because there are no activities proposed under this alternative, there will be no direct effects to wildlife. Existing habitat conditions would remain unchanged on the 20 acre lease site and MH road corridor.

Indirect Effects

As described previously, The LAU site was chosen because of its unique values, its proximity to HETF and the Hilo research center. Also the site is located on lands managed by State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, a cooperator with

IPIF and HETF. Public education and demonstration provided by HETF is a key component of maintaining Hawaii's native biodiversity (http://www.state.hi.us/dlnr/dofaw/cwcs/what_is.htm), as well as the recovery of many of threatened and endangered species (USFWS 1998, USFWS 1984, USFWS 2004, USFWS 2005, USFWS 2006a). Under this alternative, no facilities would be constructed. While another site away from HETF would likely be selected at some point in the near future, selection of this alternative may delay or reduce somewhat educational/demonstration opportunities from that of the action alternatives.

Cumulative Effects

Because there are no direct effects and only short-term indirect effects, there are no cumulative effects to wildlife anticipated under this alternative.

Alternatives 2 through 4

Facility Construction

Direct and Indirect Effects

Construction of proposed facilities (see Alternatives Analyzed section) would result in disturbance and soil scarification on up to three acres under all alternatives. Due to the dominance of pasture grass it is anticipated that disturbance will occur largely to non-native vegetation. All efforts in facility design would preserve existing native 'ohia and pisonia trees. While removal of some native trees may be necessary for facility construction and safety concerns, no more than 5% of native trees on the 20 acre lease would be affected. Infrastructure development associated with construction would include trenching at specific locations within the facility footprint for electrical, propane, and septic systems. Construction of necessary facilities would involve the removal of vegetation and a loss of herbaceous habitat on up to three acres due to construction of the facilities (structures and parking lot). Conversely, native vegetation would be restored on all lands within the fence perimeter that were not used for structures (one to two acres). So although there may be a small loss of predominately non-native vegetation/habitat, restoration of native vegetation will improve habitat conditions on portions of the site and overall there will be little change in habitat due to the proposed activities.

Effects on wildlife include short-term disturbance (1 season) and avoidance by mobile species on the affected area and possible mortality to less mobile species that occupy the understory (grasses and shrubs) on the areas actually disturbed. Although with implementation of WL-1 that prevents any tree removal during much of the breeding season (May 1 through July 31), potential mortality of young/eggs of any cavity or tree roosting/nesting species would be greatly reduced or eliminated. As a result effects to these species would consist largely of short-term (1 season) avoidance. Also because only a small portion of the site (2-3 acres) would be affected and 95% of the native trees unaffected, suitable habitat for all wildlife that use the area, would continue to be widely available. As a result anticipated direct and indirect effects are of limited extent and insignificant.

Power

Direct and Indirect Effects

Under these alternatives power for the facilities would be supplied by extension of electrical lines from existing service adjacent to the MH Road. Portions of electrical service would be buried to

mitigate visual impacts on approximately 0.3 miles. Also some overhead lines would be necessary at the facility site.

Effects to wildlife include short-term (1 season) behavioral avoidance during construction. Also because power lines provide perching, roosting and nesting structures, raptors and other birds are attracted to them, which can result in impacts (collision and electrocution) to resident and migratory birds (Avian Power Line Interaction Committee (APLLC) 2006).

Body size is one of the most important characteristics that make certain species susceptible to electrocution. Outstretched wings or other body parts that span the distance between energized conductors make electrocution risk much greater for large birds; although small birds can be electrocuted on closely spaced energized equipment such as transformers. However implementation of avian protection guidelines (WL-7 in Table 4) is expected to effectively eliminate potential impacts to the Hawaiian hawk and other native songbirds. As a result and considering that all power lines will be constructed within an existing road corridor and the small amount of affected habitat, direct or indirect effects are insignificant.

Fencing

Direct and Indirect Effects

Ungulate proof fencing is proposed on up to three acres. The fence would be four to six feet tall and made of steel posts and steel or galvanized wire. Also the width of fence stays on the bottom will be narrow (1" X 1") to restrict or prevent access for some non-native predators. To construct the fence, trimming of vegetation with hand operated tools (i.e., handsaw, machete, weed eater, chainsaw) will be completed on 6 a foot (ft) wide corridor. Fence construction would involve driving posts into the ground on approximately a ten foot spacing, with fence being attached to the outside of the posts. The bottom of the fence may be buried or secured to prevent access from ungulates. Also fence construction may involve some removal of trees for fence construction, as well as trees that are close to and may fall on the fence.

Like the facility construction, effects to wildlife include short-term disturbance of mobile species and/or possible mortality to less mobile species affected by clearing the fence line (approximately 0.25 acres affected). However mortality related impacts would be minimized with implementation of WL-1, restricting tree removal during much of the breeding season (May 1 through July 31). The fence itself would also pose a threat to wildlife which can be injured or killed if it were to strike the fence. However potential injury is greatest from fences constructed with barb wire or other sharp edges and implementation of WL-3 requires that the top wire or the portion of the fence most likely to be struck, consist entirely of smooth wire. As a result the potential for injury is greatly reduced. Additionally in order to ensure that this mitigation measure is effective, the fence line will monitored for a period of three years and if necessary, appropriate mitigation measures implemented (WL-7 in Table 4).

The entire facility (up to three acres) would be fenced, which would exclude cattle and feral ungulates from the site and help restore native vegetation on disturbed areas. Although only a small area (up to 1 ½ acres) would be affected by the re-vegetation/fencing, it would be the first time in over 100 years that the site would not have been exposed to grazing. Consequently native herbaceous and woody vegetation would become re-established and provide habitat for native birds. Additionally small native plant demonstration gardens are expected to be developed for educational purposes.

In summary, although some adverse affects associated with fence construction are possible, fencing out non-native ungulates is recognized as a key wildlife restoration effort (USFWS 2006b) and this in combination with the educational component associated with the site would be expected to provide long-term benefits to wildlife.

Transportation/Road Activities

Direct and Indirect Effects

A total of 2.5 miles of road improvement are proposed. Improvements would consist largely of grading or smoothing out rough areas, although some resurfacing would occur along the MH road, as well as along the grassed over access road on the lease. No road widening beyond the existing road template would occur, except for the road repair at the Kapili low-water stream crossing. Road work at the low water crossing would involve a realignment of the road by up to 12 ft, for a distance of approximately 25 ft. The elevation of the road may change slightly but will match the stream on the high side maintaining the same flow capacity. The existing crossing will remain intact where it is not undercut, however traffic will be diverted away from existing undercut. Water depth indicators will be placed on each side of the stream crossing to alert vehicle drivers of water depth in the event of a large storm event. The proposed re-alignment would provide safer passage during high water events and eliminate other safety concerns related to existing road undercut.

Although disturbance related effects to wildlife would occur during construction, these would be limited to the construction period (a few months). Also because all but 25 ft. of the proposed road work would occur within the existing ROW and because wildlife are acclimated to use on the road, effects would be minor (short term) and localized.

Alternative Energy

Alternative energy sources alone cannot provide all necessary power required by the facility. However because of the demonstration/education emphasis on the site, under the proposed action alternate energy sources would be used to the extent possible. This would include the installation of both solar panels and a wind generator. The following is a discussion of each and anticipated effects to wildlife.

Solar Panels

Direct and Indirect Effects

Solar energy consists of two components including a collector and storage unit.. The type and number of solar panels will depend on the final layout of the facility, roof aspect and proximity to trees. Also they may consist of a combination of roof and ground mounted panels at various locations on the facility.

There will be little if any additional disturbance associated with the installation of solar panels other than what was described under facility construction. While panels/storage units would be raised above the ground/roof a few feet, they would be readily visible. Also due to their close proximity to other structures it is unlikely that wildlife would strike a collector/storage unit. As a result installation of solar panels would pose little if any direct impacts to wildlife and effects would be considered discountable. There are no indirect effects from solar panel installation anticipated.

Wind Energy

Direct and Indirect Effects

Installation of a wind generator is intended to serve as a demonstration of a “green” alternative that can be used to reduce pollution and initially three wind generators were being considered for use on the site. However due to potential impacts to T&E species only a single wind turbine is proposed. The wind energy proposals under Alternative 2 include the following:

- A single wind generator with three, 3.4 meter rotors and a rated capacity of 10 kW.
- A 30 m. lattice or tubular guyed wire tower.
- Total wind generator/tower height will be 33.4 meters (@ 120 ft).

The location of the tower/generator has yet to be finalized, but because it needs to be approximately 200 ft. from tree line, it would likely be installed at the facility site either in the northeast corner of the lease, or in the openings in the northwest (See Figure 1).

The tower would consist of a tubular or lattice pole that would have guy wires (3/16” diameter wires) attached at 20 ft. intervals. The guy wires would be anchored at four locations, each approximately 50 ft. from the tower base. The four guy wire anchors would be sunk in the ground up to 12 ft. in depth, whereas the tower base would be buried 3-4 ft. in depth. Once installed the tower and guy wires would cover an area approximately 0.2 acres in size. The wind generator would consist of a horizontal axis three blade turbine. Turbine rotors would be up to 3.4 meters in length and the rotor sweep area (RSA), which is the airspace in which the turbine blades rotate, would be approximately 36.3 m².

Direct Effects

Direct effects on wildlife from tower installation include disturbance and avoidance of the immediate area while the tower is being installed. However any disturbance during installation would only occur for a few days and would be short-tem and of limited extent (i.e. small area affected). Direct effects to wildlife in the form of mortality from operation of wind turbines are well documented (Kunz *et al* 2007, Johnson *et al* 2004, USFWS 2003, Arnett *et al* 2008) and can occur to birds and bats being killed directly by collisions with wind turbine rotors or towers. The following discussion is related primarily to birds, whereas effects to bats are discussed under effects specific to the Hawaiian hoary bat.

In-depth studies of avian use and mortality at wind plants began in the mid 1980s. Earlier studies involved only a few turbines or focused on nocturnal migrants (waterfowl or passerines) (CEC 1996). In recent years there have been numerous studies in the United States and Europe that have intensively investigated the effects of wind turbine development on birds and bats (Kunz *et al* 2007), Arnett *et al* 2008).

However the potential for effects to wildlife varies greatly depending the size and number of wind generators/towers installed, as well on the location of the wind generator. For example, while both bird and bat mortality is greatest on ridge tops (Kuntz *et al* 2007) and on sites used as migration corridors (Kuntz *et al* 2007, Johnson 2004), little or no bird mortality has been documented within some industrial wind development areas that occur outside of migration corridors (Kerlinger 2000). This is a consideration at the Laupahoehoe site, because the site is on the lower slopes of Mauna Kea and is not in an area where birds are not known to concentrate.

Additionally resident species are less likely to be affected and a radar study on Lana'i, shows that species such as Hawaiian petrel are able to detect and avoid meteorological towers (Castle and Cook 2008), reducing potential mortality.

Potential bird/bat collisions would be expected to be further reduced due to the small size of the proposed wind turbine. For example most of the existing studies that document bird/bat mortality come from sites that often contain many industrial sized wind turbines with 20 m. to 40 m. rotor length and 1500 m² to 5000 m². RSA (Arnett *et al* 2008). The single wind turbine proposed at the Laupahoehoe site is comparable to the size normally used by home owners and will only have a 3.4 m. rotor length and a 36 m² RSA. Consequently the area affected by the rotors would be significantly less than the industrial sized turbines and the mortality that has been documented at industrial development sites would not be expected to occur at the Laupahoehoe site. This is consistent with direction found in some State Wildlife Management agencies, that small (<100 kW rated capacity) individual wind turbines are seldom associated with wildlife fatalities or significant effects (Wisconsin DNR 2006).

Potential risks of collision are further reduced by implementation of project mitigations that increase visibility of the tower/turbine and curtail wind generation in the evening, when risk of collision would be greatest. The following is a summary of MITIGATIONS's designed to minimize or eliminate direct impacts to birds and bats:

- In order to reduce potential impacts to bats and night flying birds, wind generators will not be operated during periods of bat activity (½ hour before sunset to ½ hour after sunrise).
- In order to increase visibility and minimize the potential for bird/bat collisions, the tower and turbine will be painted white. Also white, 1-inch poly tape will be fitted to all guy wires and bird diverters will be added between sections of tape. Finally two 3-foot sections of yellow polyvinyl chloride (PVC) tubing will be placed on each guy wire, starting at the anchor point.
- In order minimize the likelihood that a bat/bird would be attracted to the tower, no lights will be installed on the tower.

In summary, effects to wildlife from wind generators are well documented and under Alternatives 2-4, installation of the proposed wind generator has the potential to result in mortality to wildlife. However based on the above analysis and the following rationale, particularly implementation of project mitigation measures that curtail use during high risk periods and increase tower/turbine visibility, potential direct impacts to wildlife are greatly reduced.

- Curtailment of wind generation during the evening will effectively eliminate the potential for a bat or bird to collide with a moving rotor.
- Painting the tower/turbine white will increase visibility and greatly reduce the likelihood that a bat/bird will collide with a stationary rotor or the tower. Additionally bird diverters similar to those proposed have been proven to be effective at reducing bird/tower collisions (Castle and Cook 2008).
- Although the Laupahoehoe site provides habitat for and is utilized by resident birds, it does not occur within migration areas, where most of the bat and bird mortality associated with wind turbines has been documented (Johnson *et al* 2004, Kunz *et al* 2007,

and Arnett *et al* 2008). As a result and considering only a single, small (10 kW) wind turbine will be installed, potential risks are greatly reduced.

- Site specific monitoring (WL-7 in Table 4) will be conducted to ensure that project mitigation measures are effective.
- Less than ½ of an acre would be affected by the proposed wind turbine and unaffected open, forest and savanna habitat would continue to be widely available across the lease, as well as on adjacent lands.
- With implementation of project mitigation measures and based upon anticipated effects, the project is in compliance with Executive Order 13186-Responsibilities of Federal Agencies to Protect Migratory Birds and in compliance with the MBTA.

Indirect Effects

Indirect impacts to birds and bats from wind turbines can occur in the form of disruptions of foraging behavior, breeding activities and migratory patterns resulting from alterations in landscapes used by nocturnally active birds and bats (Kuntz *et al* 2007). As described previously the tower site occurs within existing openings and there would be no change in habitat conditions. However the tower and guy wires would cover an area approximately 0.2 acres in size and it is likely that bird foraging and possibly ground nesting activity would be modified on the area affected by the tower (0.2 acres). However because of the small amount of habitat affected and the continued availability of suitable habitat on the lease, any indirect effects are of limited extent and considered discountable.

Alternative 5

Effects to wildlife under this alternative would be similar as those described under the other action alternatives (Alternatives 2-4), except that anticipated effects from the wind turbine described above would not occur.

Cumulative Effects

As described under the Analysis Process section of this document, anticipated cumulative effects were evaluated by looking at effects of activities that occur within ¼ mile of the lease or affected MH road corridor. Anticipated changes in land use and future activities within the analysis area are summarized in Table 5. Information presented displays ongoing and anticipated future (next 2-5 years) activities within the immediate area of the Laupahoehoe site. Lands within the cumulative effect area have mixed ownership and include lands owned or managed by the State of Hawaii, KMM Schools, and Forest Service, as well as private land.

Table 5: Laupahoehoe Site Cumulative Effect Summary

Ownership/ Management	Future Activities	Ongoing Activities
KMM Schools	Agricultural land - No known activities	No change in existing use
	Non-agricultural/forest - Biological inventories and possibly some invasive weed treatment.	
Private	No changes from existing use	
State	Continued grazing	Grazing within and adjacent to the lease

Ownership/ Management	Future Activities	Ongoing Activities
	Possible restoration of State lands south and east of the site by the USFWS and volunteers. Would depend on the availability of facilities.	
US Forest Service/HETF	On-going research and management activities within the Natural Area Reserves	Installation of Stream gauges in the Laupahoehoe Unit at approximately 2,000 feet elevation. Installation of weather station adjacent to Blair Road @ 3,500-4,000 feet elevation

Alternative 1

As can be seen from Table 5, there are few changes in existing uses anticipated. State lands in and around the lease will continue to be grazed and there is no new development on agricultural or private lands anticipated. Other than grazing on State lands, most of the anticipated future activities are related to development of the Laupahoehoe experimental unit. Anticipated cumulative effects include; 1) increased use of the MH road and 20 acre lease, road 2) continued impacts to native vegetation and wildlife from grazing, 3) some native habitat restoration (up to 1 acre on the facility & on adjacent State land), and 4) installation of the proposed weather station and stream gauges.

Because there will be few changes in existing use or habitat conditions and considering the small size and localized nature of the activities anticipated in the future, there are no significant cumulative effects to wildlife or wildlife habitat anticipated under Alternative 1.

Alternatives 2 through 5

Cumulative effects under alternatives 2 through 4 include activities described under Alternative 1 and direct and indirect effects described above under these alternatives. Although activities proposed under the Action Alternatives would affect native and non-native of habitat on up to 3 ½ acres and increase disturbance into and at the lease, based on the analysis of direct and indirect effects and the following rationale, implementation of Alternatives 2 through 5 would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to wildlife.

1. Only a small area of existing habitat would be affected.
2. Implementation of MITIGATIONS's will greatly reduce potential impacts from proposed activities.
3. Because affected habitat consists largely of non-native vegetation, has been altered for decades by grazing and has been affected by non-native predators, it does not provide preferred habitat conditions for many native species.
4. Native vegetation will be re-stored on some areas and this would provide improved habitat conditions for native wildlife.
5. There are no significant changes in existing uses on other ownerships and effects of anticipated future activities are of limited extent.

6. Installation of the facilities will encourage research and education related to maintaining Hawaii's native biodiversity.

Species Specific Effects

This section evaluates effects of alternatives considered in the LAU site EA on federally threatened and endangered species and Hawaii Species of Greatest Conservation Need. Species evaluated in detail are identified in Table 3.

Threatened and Endangered Species

Hawaiian Hoary Bat

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to the Hawaiian hoary bat or its habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaiian hoary bat.

Alternatives 2, 3 and 4

Treatments proposed under Alternative 2 are discussed under the Alternative Effect Section above. The following is a discussion of anticipated effects specific to the Hawaiian hoary bat from implementation of these activities. Also the discussion of effects to the Hawaiian hoary bat presented here, are based on implementation of the following mitigations:

- WL-1 - In order to reduce potential disturbance to roosting bats, no tree removal will occur when lactating or non-volant bats are present (April 15th through September 1st).
- WL-2 - In order to reduce potential impacts to bats, wind generators will not be operated during periods of bat activity (½ hour before sunset to ½ hour after sunrise).
- WL-3 - In order to reduce potential impacts to foraging bats, only smooth wire will be used on the top of any fences constructed
- WL-4 - In order to reduce potential impacts to foraging bats and seabirds, no lights would be installed on wind towers.
- WL-5 - In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any turbine and tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.
- WL-9 - In order to ensure that mitigations are effective at reducing impacts, visual monitoring will be conducted along all fence lines and within 100 ft. of any wind tower for a period of three years. If injury or mortality to any Threatened or Endangered Species is documented, the USFWS will be contacted and appropriate mitigation measures implemented.

- Veg-1 - Removal of native tree species will be minimized (@95% unaffected) and disturbed areas will be restored with native plant species.

Direct Effects

Roosting Bats

Although there are no documented roosts on the lease, considering the availability of suitable habitat and documentation of the Hawaiian hoary bat near the site (USGS 2007), it is possible that bats could be roosting in trees affected by the facility construction. However with implementation of WL-1 above, potential roost trees would not be removed during the breeding season when volant bats are present. As a result there is no mortality to roosting bats anticipated, and effects would be restricted to possible short-term behavioral avoidance. Although due to the small number of potential roost trees affected and considering that tree removal would not occur when flightless bats or lactating females are present, the potential for mortality to roosting bats is remote, of limited extent and considered discountable.

Foraging Bats

Because all facility construction, fencing, road work, and power/alternate power activities would occur during the day, there are no direct effects to foraging bats anticipated from the construction activities. However some facilities including the fencing (up to 3 acres) and proposed wind turbine under these alternatives could result in injury or potential mortality to foraging bats. The following is a discussion of each of these activities:

Wind turbine and Tower – Hawaiian hoary bats forage for insects at variable heights in open areas such as grasslands and shrublands and along forest edges. As a result a Hawaiian hoary bat could collide with the tower, guy wires or wind turbine. While there has been little research conducted on small wind turbines similar to that proposed, direct effects to bats in the form of mortality from operation of large industrial wind turbines is well documented (Kunz *et al* 2007, Johnson *et al* 2004, USFWS 2003, Arnett *et al* 2008).

However the potential for effects to bats varies greatly depending the size and number of wind generators/towers installed, as well on the location of the wind generator. For example, estimates of bat fatalities were highest at wind energy facilities located on forested ridge tops in the eastern US and lowest in relatively open landscapes in the mid-west and western states (Kunz *et al.* 2007, Arnett *et al* 2008). Also while bat mortality is greatest on migratory foliage-roosting species including the hoary bat (*Lasiurus cinereus*), fatalities of summer resident bats usually were low (Arnett 2008). These are considerations at the Laupahoehoe site, because the Hawaiian hoary bat does not exhibit similar long-distance migrations (USFWS 1998) and potential effects to this resident species would be expected to be much less than those observed in areas containing large numbers of migrating bats. Additionally, evidence from some studies suggests that the mortality with turbines did not involve foraging bats, because no feeding buzzes were included among the 452 bat passes documented (Johnson *et al* 2004 p. 9), indicating that non-resident migrant bats were at much greater risk than resident bats.

Potential bat collisions would be expected to be further reduced due to the small size of the proposed wind turbine. For example most of the existing studies that document bat mortality come from sites that often contain many industrial sized wind turbines with 20 to 40 meter rotors and 1500 to 5000 m² RSA's (Arnett *et al* 2008). The single wind turbine proposed at the Laupahoehoe site, is the size normally used by home owners and will only have a 3.4 m. rotor length and a 36 m² RSA. Consequently the area affected by the rotors would be significantly less

than the industrial sized turbines and the level of mortality that has been documented at industrial development sites would not be expected to occur at the Laupahoehoe site.

It has also been speculated that mortality may be higher in juvenile bats due to reduced echolocation and flight capabilities. However Arnett *et al* (2008) found that in most studies fatalities were dominated by adults, refuting the hypothesis that inexperienced juveniles may be more susceptible to turbines.

Although none of the studies reviewed by Arnett *et al* 2008 demonstrated statistically significant differences in bat fatality between turbines equipped with Federal Aviation Administration (FAA) lights and those that were unlit, Kunz *et al* (2007) hypothesized that due to the attraction to insect prey, FAA lighting may attract bats and increase the risk of collision. However because the combined tower/turbine height would not exceed 125 ft, FAA lighting is not necessary. As a result and with implementation of WL-4, no lights would occur on the proposed tower and the potential for increased risks to bats due to the presence of lights would not occur.

Several species of bats including the hoary bat seem to be attracted to turbines and video images of bats chasing turbine blades rotating at slow speeds has been documented (Kunz *et al* 2008). Although the reason for this behavior is only speculated, it does indicate that moving turbines pose a greater risk to bats. Additionally none of the studies reviewed by Arnett *et al* (2008) reported bat fatalities associated with meteorological towers and these finding support the contention that bats collide with spinning turbine blades and that they do not strike stationary blades or towers (Arnett *et al* 2008). This suggests that moving parts represent the larger threat to the bats, rather than collisions with stationary structures such as the tower or non-operating turbine.

So while there are a number of factors (single turbine, small RSW, tower size, no lights) that would indicate that the potential for bat mortality from the proposed wind turbine is low, considering that bats may be attracted to a moving turbine, the potential for harm and harassment cannot be completely discounted. As a result the only way to effectively eliminate potential risks from collision with a moving turbine is to curtail wind generation during periods of bat activity, which is accomplished with implementation of WL-2 above.

In summary, effects to the Hawaiian hoary bat from wind generators are well documented and under Alternatives 2-4, installation of the proposed wind generator has the potential to result in mortality to foraging bats. However based on the above analysis and the following rationale, particularly implementation of project mitigation measures that curtail use during periods of bat foraging activity, potential direct effects to the Hawaiian hoary bat are remote, of limited extent and considered discountable:

- Studies conducted to date indicate that bats are struck by the moving rotor blades rather than collision with a non-operational turbine (Kunz *et al*. 2007, Arnett *et al* 2008). Consequently curtailment of wind generation during periods of bat activity will effectively eliminate the potential for a bat to collide with a moving rotor.
- Because the Hawaiian hoary bat uses its vision to travel between roost/foraging areas, painting the tower/turbine white and adding white tape to all guy wires will increase visibility and greatly reduce the likelihood that a bat will collide with a stationary rotor or the tower.

- Although the Laupahoehoe site provides Hawaiian hoary bat foraging habitat, similar habitat is widely available across the landscape and the site location would not be expected to result in increased risks to foraging bats.
- Because only a single, small (10 kW) wind turbine will be installed, the potential for adverse effects are greatly reduced.
- Less than ½ of an acre would be affected by the proposed wind turbine and unaffected open, forest and savanna habitat would continue to be widely available across the lease, as well as on adjacent lands.
- Site specific monitoring (WL-9) will be conducted to ensure that project mitigation measures are effective.

Fencing, Structure, Power lines and Solar Power- Mortality to Hawaiian hoary bats from collisions with barded wire fences has been documented (USFWS 2008). While some barbed wire may be used if necessary to keep cattle out along portions of the fence, the top wire along the entire fence line will consist of smooth wire, greatly reducing the potential for a bat to be harmed. As a result and due to the small amount of fencing proposed and considering that the fence line will be monitored to ensure that mitigations are effective, potential effects from fencing are of limited extent and considered discountable.

In summary, due to the small area affected by proposed activities, widespread availability of unaffected suitable habitat and with implementation of project design features that curtail wind turbine use during periods of bat activity, increase visibility of turbine/tower, require smooth wire along the top of the fence line, seasonally restrict removal of roost trees, and require monitoring, potential direct effects to Hawaiian hoary bat habitat from proposed activities are insignificant and considered discountable.

Indirect Effects

Potential indirect effects include changes that would alter habitat, prey availability or predation to the Hawaiian hoary bat. Construction of necessary facilities under these alternatives would involve the removal of vegetation and a loss of herbaceous habitat due to construction of the facilities (structures and parking lot). Conversely, native vegetation would be restored on all lands within the fence perimeter that were not used for structures. As a result there would be little change in available Hawaiian hoary bat habitat. Finally although some adverse affects from these activities are possible, fencing out non-native ungulates and predators, in combination with the educational component associated with the site, may provide some long-term benefits to wildlife that utilize the area, including the Hawaiian hoary bat.

Cumulative Effects

Anticipated cumulative effects under these alternatives are displayed in Table 5 and discussed under the Alternative Effect Section. Although activities proposed under Alternatives 2 through 4 would result in a loss of Hawaiian hoary bat habitat on one to three acres and increase disturbance and risk of mortality, considering that; 1) affected habitat consists largely of non-native vegetation, 2) there will be little change in available roost habitat, 3) available foraging habitat will be largely un-changed, 4) implementation of mitigations will greatly reduce direct impacts from proposed activities to roosting and foraging bats, 4) native vegetation will be re-stored on some of the area affected, as well as on some adjacent State land and 5) installation of the facilities will encourage research and education related to maintaining Hawaii's native

biodiversity, implementation of Alternatives 2 through 4 would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Hawaiian hoary bat.

Summary and Determination

Activities proposed under these alternatives will result in some short-term disturbance and habitat modification and potentially increase the risk of harm to the Hawaiian hoary bat. However based on the above analysis and the following rationale, anticipated effects are remote, of limited extent and discountable. As a result, implementation of Alternatives 2-4, **May Affect, but are Not Likely to Adversely Affect** the Hawaiian hoary bat.

- Implementation of Project Design Features including; the seasonal restriction on roost tree removal, curtailment of wind generation during periods of bat activity, increasing turbine/tower visibility, and reducing impacts from proposed fencing, will effectively reduce the potential for harm.
- Site specific monitoring will be conducted to ensure that project mitigation measures are effective.
- Only a small amount of suitable habitat will be affected (up to three acres) and unaffected suitable roost and foraging habitat would continue to be widely available across the lease, as well as on adjacent lands.
- Implementation of these Alternatives will facilitate research, education and demonstration related to preservation of Hawaii's native biodiversity, including the Hawaiian hoary bat.

Alternative 5

Direct, indirect and Cumulative Effects

Direct and indirect effects under this alternative are similar to those described for the other action alternatives (Alternatives 2-4), except that under this alternative, effects described above under wind turbine would not occur. Consequently risks to foraging bats would be reduced under this alternative. Also because the tower would not be installed, avoidance of the $\frac{1}{4}$ to $\frac{1}{2}$ acres affected by the tower would not occur.

Like Alternatives 2 through 4, implementation of project mitigations would effectively reduce potential impacts from proposed activities to roosting and foraging bats. Also proposed activities would re-store native vegetation on some of the affected habitat. As a result and due to the small amount of habitat affected and continued availability of unaffected habitat, implementation of Alternatives 5 would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Hawaiian hoary bat.

Determination

Activities proposed under Alternative 5 will result in some short-term disturbance and habitat modification and potentially increase the risk of harm to the Hawaiian hoary bat. However based on the above analysis and considering 1) implementation of mitigations would effectively reduce the potential for adverse direct effects, 2) site specific monitoring would ensure that project mitigations are effective and 3) only a small amount of suitable habitat would be affected and unaffected suitable roost and foraging habitat would continue to be widely available across the

lease, as well as on adjacent lands, implementation of Alternative 5, **May Affect, but is Not Likely to Adversely Affect** the Hawaiian hoary bat.

Hawaiian Hawk

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to the Hawaiian hawk or its habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaiian Hawk.

Alternatives 2 through 5

Direct and Indirect Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Effects to wildlife in general are discussed above. Effects discussed that are specific to the Hawaiian hawk include; 1) a loss of foraging habitat on approximately one to three acres due to facility construction, 2) a loss of potential nest trees due to tree removal, 3) increased risk of harm due to construction of the wind turbine (Alternatives 2-4 only) and overhead power lines. The following is a discussion of anticipated effects:

Although no nests have been documented, potential exits for a nest to become established prior to implementation of proposed activities. If a nest were established, direct effects could occur to nesting birds and/or eggs and young, possibly resulting in harm or mortality. In order to eliminate this risk, a nest survey of the site will be conducted prior to implementation (WL-6 in Table 4). Also should an active nest be identified, no activities would be permitted within 1,320 ft. of an active Hawaiian Hawk nest between April 1st and August 15th. Consequently, with implementation of this mitigation, direct effects to nesting birds are remote, of limited extent and discountable.

Because power lines provide perching, roosting and nesting structures for raptors, proposed power line installation could result in harm or mortality to a bird due to collision or electrocution. Also although small birds can be electrocuted on closely spaced energized equipment such as transformers, outstretched wings or other body parts that span the distance between energized conductors make electrocution risk greater for large birds. In order to reduce potential risks, proposed power line installation will incorporate recommendations outlined in the Avian Protection Guidelines (APLLC 2006), which are designed to make structures “avian safe (WL-5 in Table 4). As a result and considering that all power lines will be constructed within an existing road corridor and that only a small amount of habitat would be affected, effects are of limited extent and insignificant.

Implementation of the turbine/tower (Alternatives 2-4 only) also creates potential risks to the Hawaiian hawk, due to a possible collision. However implementation of mitigations that increase

visibility of these structures and curtail use near sunrise and sunset (WL-5 & WL-2 in Table 4), reducing potential impacts.

While a small amount of suitable habitat (up to 3 acres) would be affected, the site would continue to provide suitable foraging habitat and Hawaiian hawk nesting habitat would continue to be widely available within the action area as well as on adjacent lands. The adjacent Laupahoehoe experimental unit in particular, would provide a large amount of undisturbed nesting habitat.

Cumulative Effects and Determination

Anticipated cumulative effects are described above. Although activities proposed would affect native and non-native of habitat on up to 3 acres, increase disturbance into and at the lease and increase risks due to collision with structures (wind turbine/tower (Alternatives 2-4 only) and overhead power lines), based on the analysis of direct and indirect effects and the following rationale, implementation of these alternatives would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Hawaiian hawk.

- Only a small area of existing habitat would be affected and suitable habitat would continue to be available on the action area and adjacent lands.
- Implementation of mitigations will effectively reduce potential impacts from proposed activities due to collision with structures.
- Native vegetation will be re-stored on some areas and this would provide improved habitat conditions on some of the affected area.
- There are no significant changes in existing uses on other ownerships and effects of anticipated future activities are insignificant.
- Installation of the facilities will encourage research and education related to maintaining Hawaii's native biodiversity.

With implementation of these mitigation measures and considering the small amount of habitat affected, potential effects to the Hawaiian hawk are remote, of limited extent and considered discountable. However because there would be some small changes in habitat and possible short-term avoidance of the area during construction, implementation of Alternatives 2-5, **May Affect, but are Not Likely to Adversely Affect** the Hawaiian hawk.

Hawaiian Crow

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to the Hawaiian crow or its habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaiian Crow.

Alternatives 2 through 5

Direct, Indirect and Cumulative Effects and Determination

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work. Because there are no wild populations of Hawaiian crow, there would be no direct effects to this species. Although indirect effects in the form of habitat changes described under the Alternative Effect Section would occur. Because of the small amount of predominately non-native habitat affected, anticipated indirect effects are discountable and implementation of these alternatives would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Hawaiian Crow. As a result and considering the site does not provide preferred habitat conditions and that there are no wild individuals remaining, implementation of these alternatives will have **No Effect** on the Hawaiian crow.

Hawaiian Goose and Hawai'i Duck

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to either species or their habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaiian goose or Hawaiian duck.

Alternatives 2 through 5

Direct, Indirect and Cumulative Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Effects to wildlife are discussed under the Alternative Effect Section. Although neither species has been documented on the lease or along the affected MH road corridor (USFWS 2008, UH 2008), suitable habitat exists for both species on the lease. Also marginally suitable Hawaiian duck habitat may occur seasonally along the Kapili stream, which is crossed by the MH road. Although there would be a small reduction in potentially suitable habitat, because the action area is outside the current range of the Hawaiian goose, it is unlikely this species would be directly affected. However because the Hawaiian duck has been documented within one mile of the lease, it is possible that an individual could be disturbed by activities proposed within suitable habitat and harm or harassment to a nesting bird could occur. In order to reduce this risk, the following mitigation measure will be implemented:

- WL-8 – In order to eliminate the possibility that a nesting Hawaiian duck would be disturbed, a nest survey will be conducted prior to implementation of any activities that occur within suitable nest habitat.

With implementation of the above mitigation measure and considering that neither species has been documented on the lease, there are no impacts to nesting individuals or eggs/young of either species anticipated under any action alternative. Also there are no activities proposed that would alter habitat along the pond site or greatly modify habitat along existing streams. There would

however be a small reduction in potentially suitable Hawaiian goose nest habitat due to proposed facility construction. However due to the small amount of habitat affected and considering neither species has been documented on the lease and that mitigations are in place to prevent disturbance should a Hawaiian duck nest become established, anticipated direct and indirect effects are remote, of limited extent and discountable. As a result and based on anticipated effects on other ownerships discussed above, implementation of these alternatives would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant cumulative effects to either species.

Determination

With implementation of mitigations there are no direct effects to either the Hawaiian goose or Hawaiian duck anticipated under any alternative. However because a small amount of suitable habitat for the Hawaiian goose may be modified and short-term disturbance to the Hawaiian duck could occur, implementation of these alternatives **May Affect, but are Not Likely to Adversely Affect** the Hawaiian goose and Hawaiian duck.

Hawai'i Creeper

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to the Hawai'i creeper or its habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaii Creeper.

Alternatives 2 through 5

Direct, Indirect and Cumulative Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Effects to wildlife are discussed under the Alternative Effect Section. All proposed activities would occur within a portion of the lease that is predominately open with few trees. Because this species prefers closed canopy forest, it is unlikely that suitable nest habitat would be affected. However because a few individually standing native trees may be removed, suitable foraging habitat could be affected. Also construction activities could result in some short-term behavioral avoidance of the site if a bird were to be present and the proposed overhead power line and wind turbine (Alternatives 2-4 only) would increase risks of collision/mortality to birds. In order to reduce the likelihood of collision that could result in harm to this and other birds, the following mitigation measures would be implemented:

- WL 5 (Alternatives 2-4 only) - In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any turbine/tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.

- WL 7 - Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) that are designed to make all structures “avian safe”.
- WL-9 - In order to ensure that mitigations are effective at reducing impacts, visual monitoring will be conducted along all fence lines and within 100 ft. of any wind tower (Alternatives 2-4 only) for a period of three years. If injury or mortality to any Threatened or Endangered Species is documented, the USFWS will be contacted and appropriate mitigation measures implemented.
- VEG-1 - Removal of native tree species will be minimized (@95% unaffected) and disturbed areas will be restored with native plant species.

With implementation of these mitigation measures, closed canopy nest habitat would not be affected and considering that this species has not been documented on the site (USFWS 2008, UH 2008), potential effects to the Hawaiian creeper are remote, of limited extent and considered discountable. As a result, implementation of these alternatives would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Hawaiian creeper under any alternative.

Determination

Implementation of Alternatives 2-5 could result in short-term avoidance and potential harm to the Hawaiian creeper. However mitigations that increase visibility of the proposed wind turbine (Alternatives 2-4 only), require power lines to incorporate recommendations from the avian protection guide and require post treatment monitoring, are expected to be effective at reducing impacts. As a result and based on the above analysis, particularly the absence of recent documentation on the affected area (USFWS 2008, UH 2008), implementation of Alternatives 2-5, **May Affect, but are Not Likely to Adversely Affect** the Hawaiian creeper.

Newell's Shearwater and Hawaiian Petrel

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to Newell's shearwater or Hawaiian petrel or their habitat. As a result, implementation of Alternative 1 would have **No Effect** on the Hawaiian petrel or Newell's shearwater.

Alternatives 2 through 4

Direct, Indirect and Cumulative Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Because the project area does not provide suitable breeding habitat for either species, available breeding habitat would be unaffected. However the site is considered transitory habitat and birds may occasionally fly over the area when traveling between foraging and breeding habitat. As a result and considering collision with structures have been documented as a threat to both species,

particularly Newell' shearwater (USFWS 2005, DOFAW 2005b), proposed power line and turbine/tower construction do have the potential to result in harm to both species. However the following mitigations are designed to reduce collisions and effects described below area based on implementation of these mitigation measures:

- WL 1 - In order to reduce potential impacts to bats and seabirds, wind generators will not be operated during periods of bat activity or when seabirds would be moving between foraging/breeding sites (½ hour before sunset to ½ hour after sunrise).
- WL 2 - In order to reduce potential impacts to foraging bats and seabirds, no lights would be installed on wind towers.
- WL 5 - In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any turbine/tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.
- WL 7 - Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) that are designed to make all structures "avian safe".
- WL 9 - In order to ensure that mitigations are effective at reducing impacts, visual monitoring will be conducted along all fence lines and within 100 ft. of any wind tower for a period of three years. If injury or mortality to any Threatened or Endangered Species is documented, the USFWS will be contacted and appropriate mitigation measures implemented.

A number of factors need to be considered when assessing risk including likely use of the area, the ability of the birds to avoid proposed structures and the landscape conditions surrounding the structures. The following is a discussion of these factors:

Anticipated use of the area would affect, in part, the potential for collisions. Day *et al* (2003) analyzed movement rates of Hawaiian petrels and Newell's shearwater from 18 sites scattered across the island of Hawaii. Analysis of flight data from the two sites closest to the project area (Pa'auilo and Malua stream) show that the movement rates, or birds detected/hour in these areas (0.3 to 0.5/hr) is considerably lower than sites to the north (2.4-25.8/hr) and south (1.2-3.0/hour). Also with the exception of Waipi'o Valley, some cinder cones in the Puna District of eastern Hawai'i, and some small colonies high on Mauna Loa and probably Mauna Kea, petrels and shearwaters are thought to be scarce on this island (Day *et al* 2003). Finally average flight patterns indicate that most of the birds in this area fly north and south of the site (Day *et al* 2003). So while potential exists for birds to fly over the site, this data indicates that foraging use near the project area is low, which would reduce the likelihood of a bird colliding with proposed turbine/tower or power lines.

The ability of seabirds to avoid structures is also a consideration. Although there is no petrel/shearwater-specific literature data on avoidance of towers or other structures, data is available indicating that other seabird species detect and avoid wind turbines and other manmade structures in low-light conditions. For example, sea ducks in Europe have been found to detect and avoid wind turbines >95% of the time. Further, natural anti-collision behavior (especially alteration of flight paths) is seen in migrating Common and King Eiders (*Somateria mollissima*

and *S. fischeri*) approaching human-made structures in the Beaufort Sea off of Alaska (Day *et al.* 2005) and in diving ducks approaching offshore wind turbines in Europe (Castle and Cook 2008).

Also although Hawaiian petrels have flight characteristics very different from those of other species, they are adept at flying through forests to and from their nests during low-light conditions. Preliminary results of an avoidance behavior indicate that petrels do see and are able to avoid objects such as communication towers when in their flight path. For example, two different petrels avoided a communications tower on the Lāna‘ihale by turning 180 degrees on approaching the tower and flying in the opposite direction. Other petrels observed avoided the tower by adjusting their flight direction away from the structure (Castle and Cook 2008). Consequently considering that petrels have demonstrated a high avoidance of structures, it is reasonable to assume that petrels would likely detect and avoid large structures under average conditions of weather and visibility. Potential impacts are further reduced by mitigations that increase visibility of the wind turbine. For example, White, 1-inch poly tape was fitted to the guy wires to increase visibility and subsequently increase the likelihood of avoidance. This tape has proven effective in minimizing petrel collisions with fencing and other structures at the Lāna‘i colony (Castle and Cook 2008). Also the tower/turbine would be painted white, further increasing visibility.

A serious limiting factor of the Newell’s shearwater and potentially the Hawaiian petrel is increased urbanization and the accompanying increase in man-made lighting (USFWS 1983). Newell’s shearwater are attracted to light sources and fall to the ground exhausted after fluttering around lights for long periods of time (fallout) (Newell shearwater five year plan 2005). Fledgling shearwaters are particularly vulnerable to light attraction on their first nocturnal flight from their burrow to the sea (Shearwater 5 year plan 2005). Because proposed treatments occur in a rural area with little artificial lighting, potential for adverse effects related to artificial lighting are not expected to occur.

Potential impacts for collision were also assessed by Podolsky *et al* (1998), who evaluated mortality of Newell’s shearwaters caused by collisions with urban structures on Kauai. They compared power line characteristics in the vicinity of observed mortality and found that the height of the uppermost line was not of primary importance in causing collisions and mortality. This is consistent with Cooper and Day (1995 *In Shearwater 5 Year Plan*) who observed shearwaters flying over, among and under the line arrays on tall poles and observed directly that shearwaters attempt to avoid lines if they see them soon enough. Finally Podolsky *et al* (1998) speculated that vegetation under the pole had a greater influence, because the shearwater flew higher to avoid vegetation, which is more visible than power lines. This is a consideration on the Laupahoehoe site, because proposed power lines would occur within forested stands or corridors and power lines would be below existing vegetation, greatly reducing the likelihood of collision.

Additionally Podolsky *et al* (1998) found that landscape conditions can reduce potential shearwater mortality. For example in their study, although the northern portion of the study area had 80% of the shearwater use, it had the least mortality (Podolsky *et al* 1998). Podolsky *et al* (1998) go on to suggest that the reasons for the reduced mortality, is that 1) the northern site was rural and lacked the urban development (i.e. artificial lights) of the coastal areas and 2) power lines in the northern area were among tall trees in many areas, which they avoid. These are considerations on the Laupahoehoe site because of its rural nature, and because proposed overhead power lines would be installed on sites that contain some degree of forested cover along the road ROW. As a result it is unlikely that a shearwater or petrel would collide with the proposed power lines.

The fact that the proposed wind turbine would not be operational during the evening hours when birds are moving between foraging/breeding areas would eliminate the possibility that a bird would collide with a moving turbine. Similarly, due to the rural nature of the project area, lack of artificial lighting and the ability of birds to avoid structures, the potential for a bird to collide with the stationary turbine/tower is low. However because the turbine/tower would stick up 20 to 30 ft. above the tree line, the potential for collision cannot be completely discounted.

Determination

Based on the analysis presented above, there are no effects to breeding habitat of either species anticipated. Additionally due to the rural nature of the area, absence of artificial lighting that could result in fallout and considering that proposed overhead power lines would be below forested cover that occurs throughout the affected road/power line corridor and lease, risks of collision with power lines are remote and considered discountable. While risks of collision with proposed turbine/tower collision are low, because the turbine/tower would stick up 20 to 30 ft. above treeline, risks of collision with a petrel or shearwater cannot be completely discounted. As a result potential for harm or mortality to bird could occur and implementation of Alternatives 2 through 4, “**May Affect and are Likely to Adversely Affect**” the Hawaiian petrel and Newell’s shearwater.

Alternative 5

Direct, Indirect and Cumulative Effects

Effects under Alternative 5 are similar to those described above under Alternatives 2-4. However because this alternative would not include installation of a wind turbine/tower, risks to both the Hawaiian petrel and Newell’s shearwater are reduced. So while the proposed structures under this alternative pose a potential risk to both the Hawaiian petrel and Newell’s shearwater, based on the above analysis and the following rationale, anticipated impacts are remote, of limited extent and considered discountable. As a result, and based on anticipated cumulative effects described previously (See Table 5), implementation of Alternative 5 would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant cumulative effects to the Newell’s Shearwater and Hawaiian Petrel.

- Neither the Hawaiian petrel, nor Newell’s shearwater have been documented on the site and existing data indicates that foraging use near the action area and the likelihood of collision is low. Also radar indicates that most of the birds documented in this area fly north and south of the site (Day *et al* 2003).
- The rural (i.e. few lights) and predominately forested nature of the site would greatly reduce the likelihood of collisions resulting from artificial lighting.
- The presence of trees along the overhead power line corridor, are expected to effectively eliminate the likelihood that a bird would be flying low enough to collide with the proposed power lines.

Determination

Suitable breeding habitat for both species would be unaffected by proposed activities. While proposed power line installation has the potential to result in adverse effects to the Hawaiian petrel and Hawaiian shearwater, based on the above analysis, particularly the rural nature of the action area and presence of forested cover along the power line corridor, implementation of

Alternative 5 **May Affect, but is Not Likely to Adversely Affect** the Hawaiian petrel or Newell's shearwater

State Species of Greatest Need

Pueo, Hawai'i 'Elepaio, and 'Oma'o,

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to pueo, Hawai'i Elepaio and 'Oma'o.

Alternatives 2 through 5

Direct, Indirect and Cumulative Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Effects to wildlife are discussed under the Alternative Effect Section. Effects discussed that specific to these native honeycreepers include 1) avoidance and reduction of habitat on approximately one to three acres due to facility construction and 2) increased risk of harm due to construction of the wind turbine (Alternatives 2-4 only) and overhead power lines and 3) possible mortality to eggs/young from tree removal (Hawai'i elepaio and 'Oma'o only). However implementation of the following mitigations would effectively reduce potential direct impacts to this species:

- WL-1 - No tree removal will occur between April 15th and September 1st.
- WL 5 (Alternatives 2-4 only) - In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.
- WL 7 - Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) that are designed to make all structures "avian safe".
- VEG-1 - Removal of native tree species will be minimized (@95% unaffected) and disturbed areas will be restored with native plant species.

With implementation of these mitigation measures, potential impacts related to collision/electrocution with structures would be greatly reduced. Also because no tree removal would occur during the breeding season, potential mortality to eggs/young (Hawai'i 'Elepaio, and 'Oma'o,) would effectively be eliminated. Finally restoration/maintenance of native vegetation on portion of the site would improve habitat for these species and due to the small amount of habitat affected (3 acres) suitable habitat would continue to be available on the site, as well as on adjacent lands. Collectively for these reasons and considering implementation of proposed facilities would help raise awareness of the need to maintain Hawaii's native diversity and that

these species have not been documented on the site (UH 2008), potential effects are remote, of limited extent and considered discountable. As a result, implementation of these alternatives would not measurably contribute to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Pueo, Hawai'i 'Elepaio, and 'Oma'o.

Apapane, 'I'iwi, and Hawai'i 'Amakihi

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

Because there are no activities proposed under this alternative there will be no direct, indirect or cumulative effects to the Apapane, 'I'iwi, and Hawai'i 'Amakihi.

Alternatives 2 through 5

Direct, Indirect and Cumulative Effects

Activities proposed under these alternatives are discussed under the Alternatives Section of this document and include facility construction, installation of power and alternate energy sources, fencing and road work.

Effects to Wildlife are discussed under the Alternative Effect Section. Effects discussed specific to these species include; 1) avoidance and loss of habitat on approximately one to three acres due to facility construction and 2) increased risk of harm due to construction of the wind turbine (Alternatives 2-4 only) and overhead power lines and 3) possible mortality to eggs/young from tree removal. However implementation of the following mitigations would effectively reduce potential direct impacts to this species:

- WL-1 - No tree removal will occur between April 15th and September 1st.
- WL 5 (Alternatives 2-4 only) - In order to reduce the likelihood of collision and the potential for injury or harm to resident or migratory species, any tower installed will be painted white and utilize 1-inch poly tape, fitted to the guy wires to increase visibility. Bird diverters will be added between sections of white tape.
- WL 7 - Construction of over head power lines will comply with recommendations outlined in the Avian Protection Guidelines (APLLC 2006) that are designed to make all structures "avian safe".
- VEG-1 - Removal of native tree species will be minimized (@95% unaffected) and disturbed areas will be restored with native plant species.

With implementation of these mitigation measures, potential impacts related to collision with structures would be greatly reduced. Also because no tree removal would occur during the breeding season, potential mortality to eggs/young would be greatly reduced. Finally restoration/maintenance of native vegetation on portion of the site would improve habitat for these species. Also due to the small amount of habitat affected (3 acres), suitable habitat would continue to be available on the site, as well as on adjacent lands. Collectively for these reasons and considering implementation of proposed facilities would help raise awareness of the need to maintain Hawaii's native diversity, potential effects are remote, of limited extent and considered discountable. As a result, implementation of these alternatives would not measurably contribute

to any other past, current or reasonably foreseeable future activity that would result in significant effects to the Apapane, 'I'iwi and Hawai'i 'Amakihi

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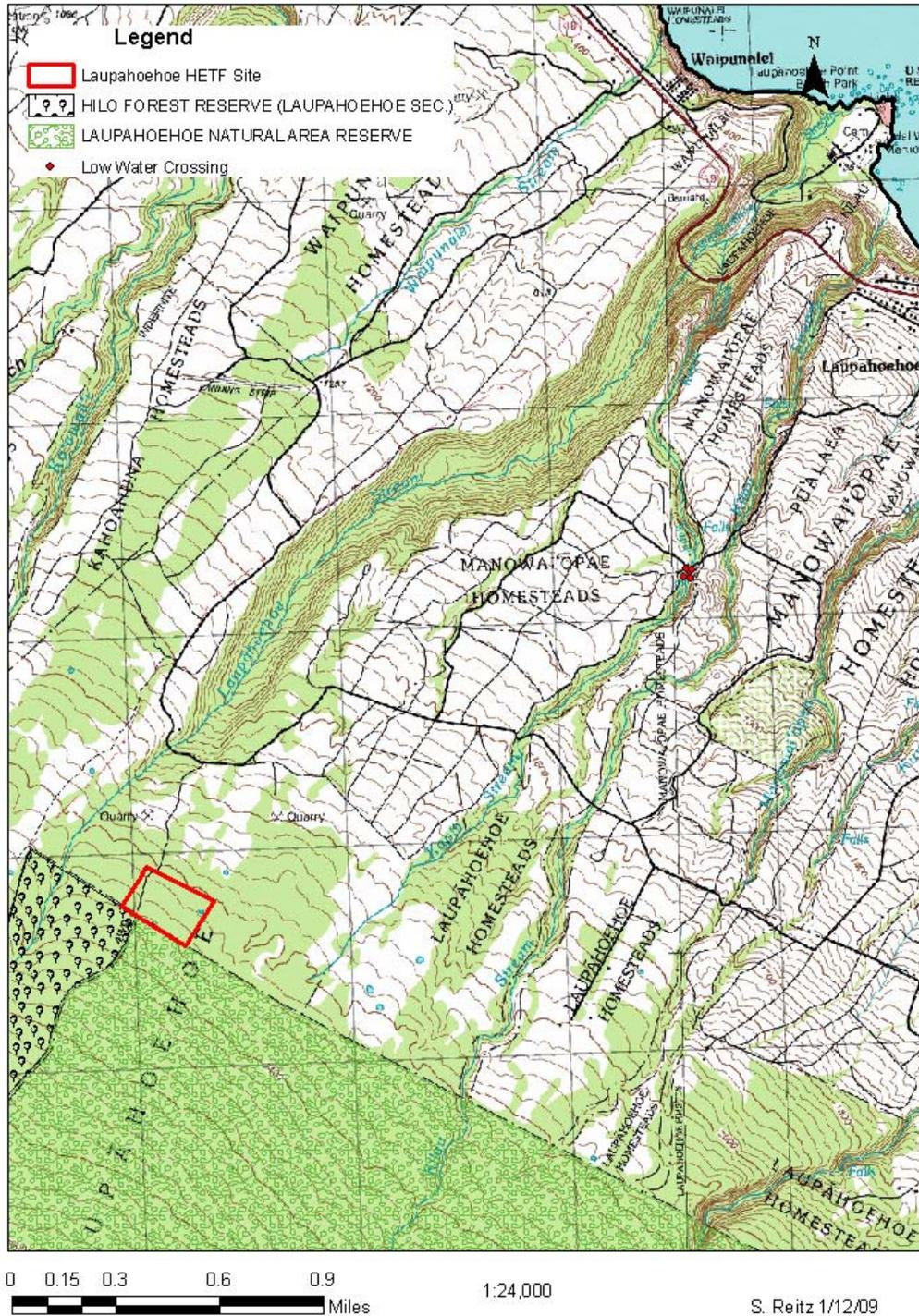
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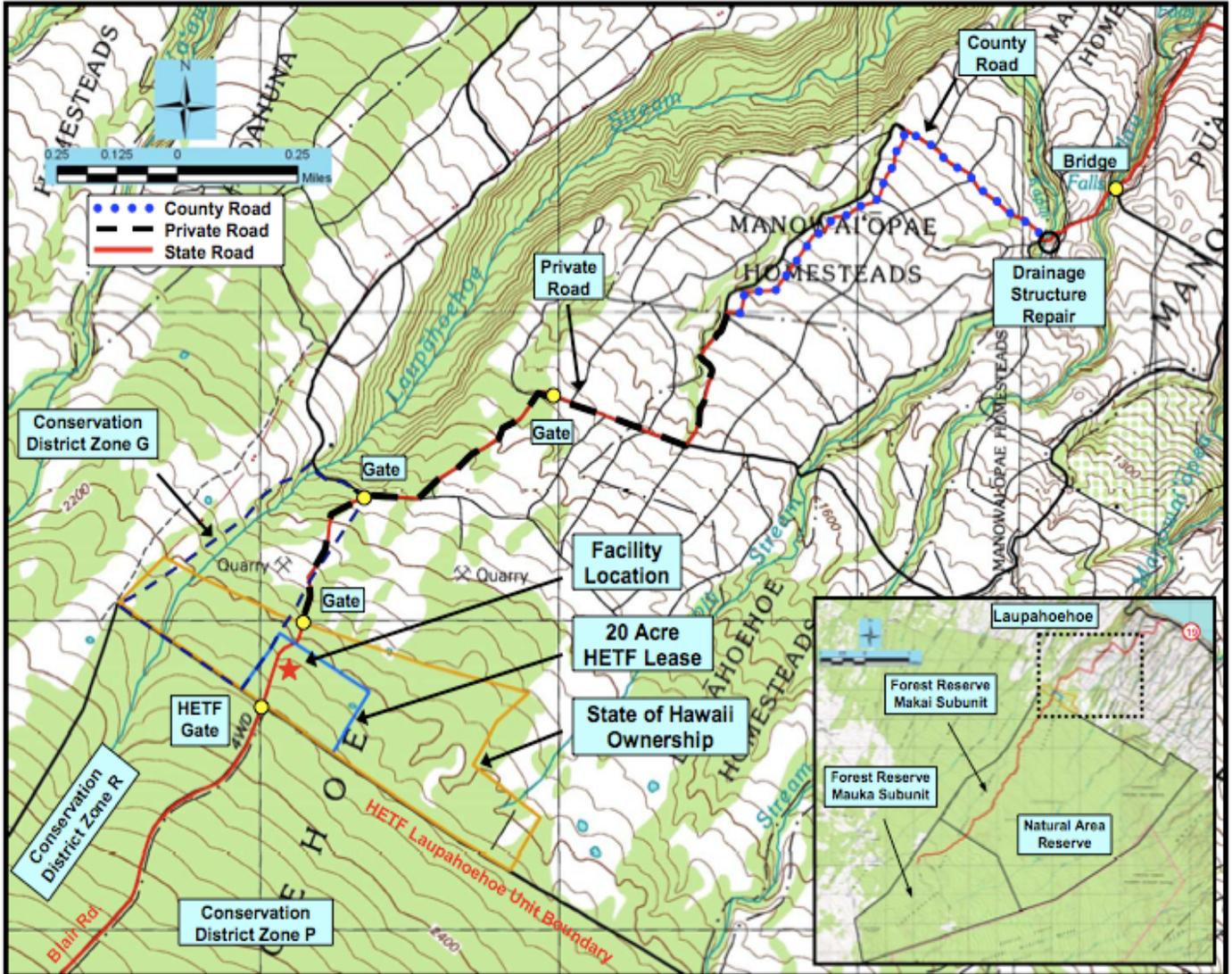
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Appendix A – Maps and Figures

Map 1: Laupahoe Site Vicinity Map

Laupahoe HETF Site





Map 2: Laupahoehoe HETF Treatment Map with Road Ownership

Map 3: Laupahoe HETF Treatment Map with Power line Locations

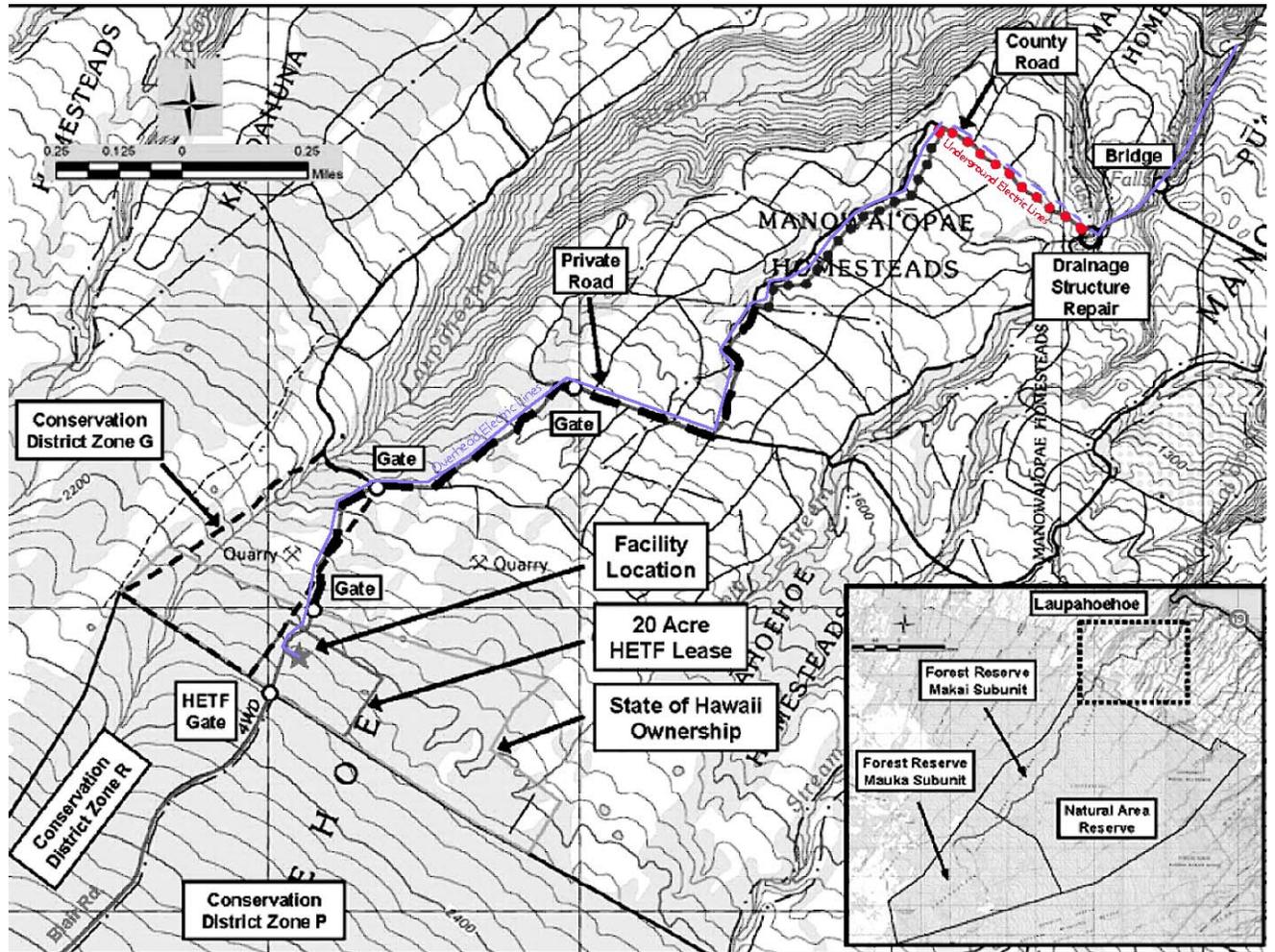


Figure 1: Laupahoehoe Lease Site



Figure 2: Laupahoehoe Site (Grassland/Savannah)



Figure 3: Laupahoehoe Site (Pond Site)



Figure 4: Laupahoehoe Site (Forest)



Figure 5: Low Water Crossing



Appendix B – Wildlife and Plant Survey Data

Laupahoehoe Facility Construction Project Plant Species List.

Laupahoehoe HETF Botanical Survey **October 13th, 2008**

List prepared by: Lyman Perry, Hawaii District Botanist, Division of Forestry and Wildlife, Hilo, HI 96720

Powerline Corridor

The powerline corridor is mostly open pasture dominated by introduced grasses with non-native trees and the occasional native tree scattered throughout. A portion of the powerline corridor runs through a stand of planted *Eucalyptus grandis*. No endangered or threatened plant species or habitat was observed along this corridor.

Native trees:	Common Name:	Family Name:
<i>Metrosideros polymorpha</i>	Ohi`a	Myrtaceae
Non-Native trees:		
<i>Aleurites moluccana</i>	Kukui	Euphorbiaceae
<i>Casuarina equisetifolia</i>	Ironwood	Casuarinaceae
<i>Eucalyptus grandis</i>		Myrtaceae
<i>Melia azederach</i>	Pride of India	Meliaceae
<i>Persea americana</i>	Avocado	Lauraceae
<i>Psidium cattleianum</i>	Strawberry guava	Myrtaceae
<i>Psidium guajava</i>	Common guava	Myrtaceae
<i>Spathodea complanata</i>	African tulip	Bignoniaceae
Non-Native shrubs:		
<i>Buddleia asiatica</i>	Dog tail	Buddleiaceae
<i>Clidemia hirta</i> *	Koster's curse	Melastomataceae
<i>Cordyline fruticosa</i>	Ti leaf	Agavaceae
<i>Melastoma candidium</i>		Melastomataceae
<i>Pluchea symphitifolia</i>	Sourbush	Asteraceae
Non-Native Ferns, Grasses and Herbs:		
<i>Andropogon virginicus</i> *	Broom sedge	Poaceae
<i>Adiantum hispidulum</i>	Rough maidenhair fern	Pteridaceae
<i>Arundina grandifolia</i>	Bamboo orchid	Orchidaceae
<i>Chamaecrista nictitans</i>	Partridge pea	Fabaceae
<i>Christella dentata</i>		Thelypteridaceae
<i>Christella parasitica</i>		Thelypteridaceae
<i>Coix lachryma-jobi</i>	Job's tears	Poaceae
<i>Cyperus rotundus</i>	nut grass	Cyperaceae
<i>Desmodium sandwicense</i>	Spanish clover	Fabaceae
<i>Hedychium</i> sp.	Ginger	Zingiberaceae
<i>Melinis minutiflora</i>	Molasses grass	Poaceae
<i>Mimosa pudica</i>	Sensitive plant	Fabaceae
<i>Nephrolepis multiflora</i>	Scaly sword fern	Nephrolepidaceae
<i>Panicum maximum</i>	Guinea grass	Poaceae
<i>Paspalum conjugatum</i>	Hilo grass	Poaceae
<i>Paspalum urvillei</i>	Vasey grass	Poaceae

<i>Saccharum officinale</i>	Sugarcane	Poaceae
<i>Sacciolepis indica</i>	Glenwood grass	Poaceae
<i>Schizachyrium condensatum</i>	Bushy beard grass	Poaceae
<i>Sporobolus africanus</i>	African dropseed	Poaceae

Native Ferns:

<i>Cibotium glaucum</i>	Hapu`u pulu	Dicksoniaceae
<i>Dicranopteris linearis</i>	Uluhe	Gleicheniaceae

Laupahoehoe HETF 10 acre site

The 10 acre site is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia umbellifera* and *Acacia koa*) with thickets of non-native trees (*Toona ciliata*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*) and open areas dominated by pasture grasses. It is strongly recommended that care be taken not to harm the Papala kepau (*Pisonia umbellifera*) trees that are concentrated in the central portion of the 10 acre site. No threatened or endangered plant species or habitat were observed in this site.

Native Trees:	Common Name:	Family Name:
<i>Acacia koa</i>	Koa	Fabaceae
<i>Metrosideros polymorpha</i>	Ohi`a	Myrtaceae
<i>Pisonia umbellifera</i>	Papala Kepau	Nyctaginaceae

Non-Native Trees:

<i>Ficus macrophylla</i>	Moreton Bay Fig	Moraceae
<i>Fraxinus uhdei</i>	Tropical Ash	Oleaceae
<i>Grevillea robusta</i>	Silk Oak	Proteaceae
<i>Psidium cattleianum</i>	Strawberry guava	Myrtaceae
<i>Psidium guajava</i>	Common guava	Myrtaceae
<i>Toona ciliata</i>	Australian Red Cedar	Myrtaceae

Non-Native shrubs:

<i>Clidemia hirta</i>	Koster's curse	Melastomataceae
<i>Solanum nigrum</i>	Popolo	Solanaceae
<i>Tibouchina herbacea</i>	Cane Tibouchina	Melastomataceae

Non-native Ferns, Grasses and Herbs:

<i>Ageratum conyzoides</i>	maile-hohono	Asteraceae
<i>Andropogon virginicus*</i>	Broom Sedge	Poaceae
<i>Axonopus fissifolius</i>	Narrow-leaved Carpetgrass	Poaceae
<i>Blechnum appendiculatum</i>		Blechnaceae
<i>Chamaecrista nictitans</i>	Partridge pea	Fabaceae
<i>Christella dentata</i>		Thelypteridaceae
<i>Christella parasitica</i>		Thelypteridaceae
<i>Cirsium vulgare</i>	Bull thistle	Asteraceae
<i>Commelina diffusa</i>	Honohono	Commelinaceae
<i>Cuphea carthaginensis</i>	Tarweed	Lythraceae
<i>Cyperus halpan</i>		Cyperaceae
<i>Cyperus rotundus</i>	Nut sedge	Cyperaceae
<i>Drymaria cordata</i>	Pipili	Caryophyllaceae
<i>Ehrharta stipoides</i>	Meadow ricegrass	Poaceae
<i>Geranium carolinianum</i>	Carolina crane's bill	Geraniaceae

<i>Hydrocotyle verticillata</i>	Pohe	Apiaceae
<i>Hypochoeris radicata</i>	Hairy cat's ear	Asteraceae
<i>Lapsana communis</i>	Nipplewort	Asteraceae
<i>Mimosa pudica</i>	Sensitive plant	Asteraceae
<i>Nephrolepis cordifolia</i>	Narrow sword fern	Nephrolepidaceae
<i>Oxalis corniculata</i>	Yellow wood sorrel	Oxalidaceae
<i>Paspalum conjugatum</i>	Hilo grass	Poaceae
<i>Phymatosorus grossus</i>	Laua`e	Polypodiaceae
<i>Poa annua</i>	Annual bluegrass	Poaceae
<i>Polygala paniculata</i>	Milkwort	Polygalaceae
<i>Polygonum punctatum</i>	Kamole	Polygonaceae
<i>Prunella vulgaris</i>	Self heal	Lamiaceae
<i>Sacciolepis indica</i>	Glenwood grass	Poaceae
<i>Setaria geniculata</i>	Foxtail	Poaceae
<i>Taraxacum officinale</i>	Common dandelion	Asteraceae
<i>Verbena littoralis</i>	weed verbena	Verbenaceae
<i>Veronica plebeia</i>	Common speedwell	Scrophulariaceae

Native Ferns, Fern Allies, Herbs and Vines:

<i>Cibotium menziesii</i>	Hapu`u i`i	Dicksoniaceae
<i>Dianella sandwicensis</i>	`Uki	Liliaceae
<i>Dicranopteris linearis</i>	Uluhe	Gleicheniaceae
<i>Elaphoglossum wawrae</i>	Ekaha	Lomariopsidaceae
<i>Freycinetia arborea</i>	I`ei`e	Pandanaceae
<i>Peperomia membranacea</i>	Ala`ala wainui	Piperaceae
<i>Psilotum nudum</i>	Moa	Psilotaceae

* Invasive and Noxious Weeds (State of HI listing <http://plants.usda.gov/java/noxious?rptType=State&statefips=15> accessed 1/22/2009)

Laupahoehoe HETF Project Bird Survey Data

General Information

1) SURVEY ID: AG-9AD6-P-08-0124		2) SURVEY NAME: HAWAII EXPERIMENTAL TROPICAL FOREST (LAUPAHOEHOE) FOREST BIRD SURVEY		
3) SURVEY STATUS: COMPLETED		4) SOURCE OF WORK: U.S. FOREST SERVICE, INSTITUTE OF PACIFIC ISLANDS FORESTRY		
5) Survey Type: POINT COUNT SURVEY				
6) Survey Focus: FOREST BIRDS				
7) Estimate of Survey Area Size (acres): 23 ACRES				
8) Elevation: Min: 1133 ft Max: 2405 ft Average: 1769 ft			9) Elevation UOM:	
10) State: ®	11) County: ®	12) Region: ®	13) Forest: ®	14) District: ®
Hawaii	Hawaii	Hawaii Island	Laupahoehoe (HETF)	North Hilo
15) Parameters of Survey (Describe any ecological parameters, criteria or combinations of these used to focus the survey. (I.e., north slopes, specific habitat types, within certain forest conditions, etc.): Materials and Methods: As per the suggestion of Hawaii Forest Interagency Database Project coordinator (Richard Camp, Hawaii Cooperative Studies Unit), point-transect surveys using the fixed-radius circular plot method (see Ralph <i>et al.</i> 1995; Camp <i>et al.</i> 2008)) were conducted to determine the presence/absence of threatened and endangered species. The survey encompassed approximately 23 acres of middle-elevation habitat on the eastern slope of Mauna Kea. The road transect followed 2.5 miles of the road, with stations placed 250 meters apart, while the 20-acre (with 50-meter perimeter buffer) facility site had 4 transects with 5 stations per transect, placed 100 meters apart, forming a survey grid of 20 stations. All circular plots had a radius of 25 meters and 8-minute counts were conducted at each station (See Appendix I for maps of survey area). Counts were conducted between the hours of 0600-1100. We conducted three 2-day trials over six consecutive days (October 8 th -13 th , 2008), where half of the road stations and half of the grid stations were sampled on Day 1 of each trial, and the remaining on Day 2 of each trial, and so on. To minimize observer bias, the two observers alternated between the road and grid each day. Specific stations surveyed on the road and transects surveyed were determined by a coin toss and the direction in which stations were surveyed was varied to randomize sampling time of day for each station. Trained and calibrated observers recorded the species, detection type (auditory, visual, or both), and distance from the station center point to birds detected within the 25-meter radius. At each station, the time of sampling, weather conditions, and vegetation types were also recorded, and surveying was halted when conditions hindered the ability to detect birds (wind and gust > 20 kph, and heavy rain). Incidental detections of target species were recorded between stations, along the transect (See Appendix III for data sheets and detection/weather coding). The survey was conducted during the non-breeding season of species listed as "target species" (See Appendix V for breeding cycles of target species), yet the target species, for which suitable habitat was found; are non-migratory. If target species are sedentary, breeding seasonality should not impact their presence/absence in the area surveyed. Therefore, this survey should account for all target species that make frequent use the area, and as residents, would also use this area during their breeding season. Assuming detection probability increases during the breeding season with courtship song, this survey should be considered a conservative estimate of target species presence/absence.				
16) Survey Comments (Directions, area description, specific comments by visit date, etc.): The survey site is on the island of Hawaii, in the North Hilo district, in the town of Laupahoehoe, which is 23 miles from Hilo on Highway 19. In Laupahoehoe, turn left at the road just after the Laupahoehoe Train Museum (Manowaiopae Homestead Rd.). Cross the wooden bridge at the fork in the road, and this road becomes Blair Road. The survey area spans Kamehameha Schools land and State of Hawaii parcels, with only one transect (transect D) above the Forest Reserve boundary. The survey area includes 2.5 miles of Blair Road (14 survey stations) and a 20-acre (plus 50 m buffer) grid of 20 survey stations along 4 transects. (See map below and maps in Appendix I). The roadside vegetation includes successive cane fields, eucalyptus stands, and grazed pasture interspersed with native and non-native vegetation. The grid contains both open and closes sections, with open pasture interspersed with native and non-native vegetation and areas of dense, closed forest, mostly dominated by non-native vegetation. Pigs and cows are present along both the road and within sections of the grid, with heavy pig damage within sections of the grid.				

Survey Visits

17) VISIT DATE ®	18) LAST NAME ® AND FIRST NAME OF EXAMINERS FOR EACH VISIT
10/8/08-10/13/08	GAUDIOSO, JACQUELINE
10/8/08-10/13/08	HSU, BOBBY

Target Species

Required. List all targeted species (Threatened, Endangered or State Listed species) that are the Focus of the survey. Enter all the species individually All columns are required.

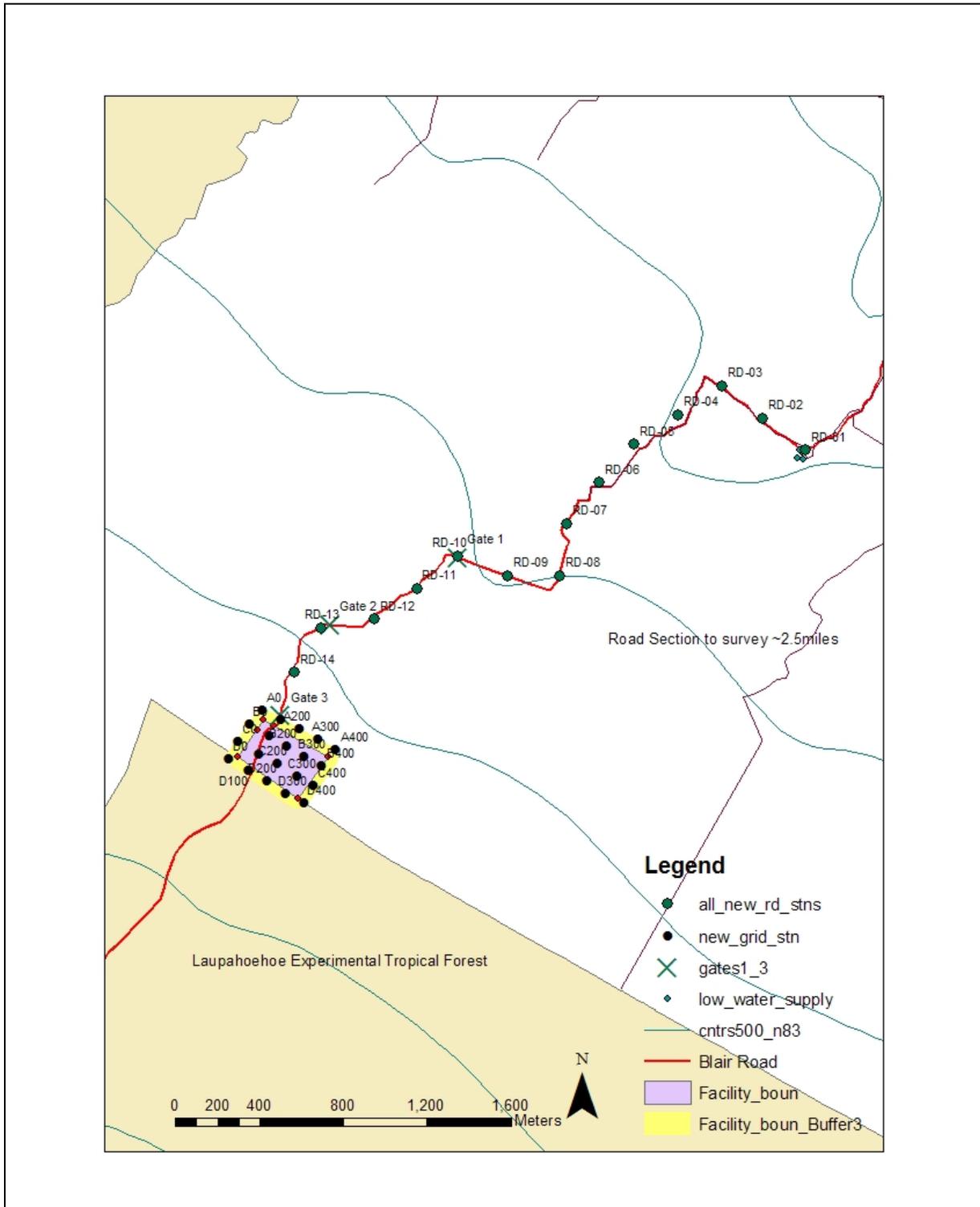
Appendix B – Table 1: University of Hawaii Bird Survey Results (Native Species)

Scientific name (Common Name(s))	21) ® Suitable habitat found	22) ® Species Found	23) ® Comments
<i>Oreomystis mana</i> (Hawaii Creeper)	yes	no	
<i>Buteo solitarius</i> (Hawaiian Hawk)	yes	yes	No EO form filled out
<i>Pterodroma phaeopugia sandwichensis</i> (Hawaiian Petrel)	no	no	
<i>Chasiempis sandwichensis sandwichensis</i> (Hawaii ‘elepaio)	yes	no	
<i>Myadestes obscurus</i> (Hawaiian Thrush, O’ma’o)	yes	no	
<i>Hemignathus virens</i> (Hawaii ‘amakihī)	yes	yes	
<i>Vestiaria coccinea</i> (I’iwi)	yes	yes	
<i>Himatione sanguinea</i> (‘Apapane)	yes	yes	NOTE: High occurrences found
<i>Asio flammeus sandwichensis</i> (Short-eared Owl, Pu’eo)	yes	no	
<i>Branta sandvicensis</i> (Hawaiian Goose, Nene)	no	no	
<i>Anas wyvilliana</i> (Hawaiian Duck, Koloa)	yes	no	
Optional. List other species found during the survey. Record the species code, scientific name or both. Indicate habitat (locally defined), lifeform and cover abundance (all optional). Indicate non-native plants with "X"			
26) Comments (e.g. details about species list approach, habitat focus, vegetation types or structure, etc.): The raw data of species counts per station by day can be found in a table in Appendix II. From the descriptions of vegetation recorded at each station, we categorized the vegetation type into four categories: 1. <i>Open/ Native dominated (ON)</i> 2. <i>Open/Non-native dominated (ONN)</i> 3. <i>Closed/ Native dominated (CN)</i> 4. <i>Closed/ Non-native dominated (CNN)</i> .			

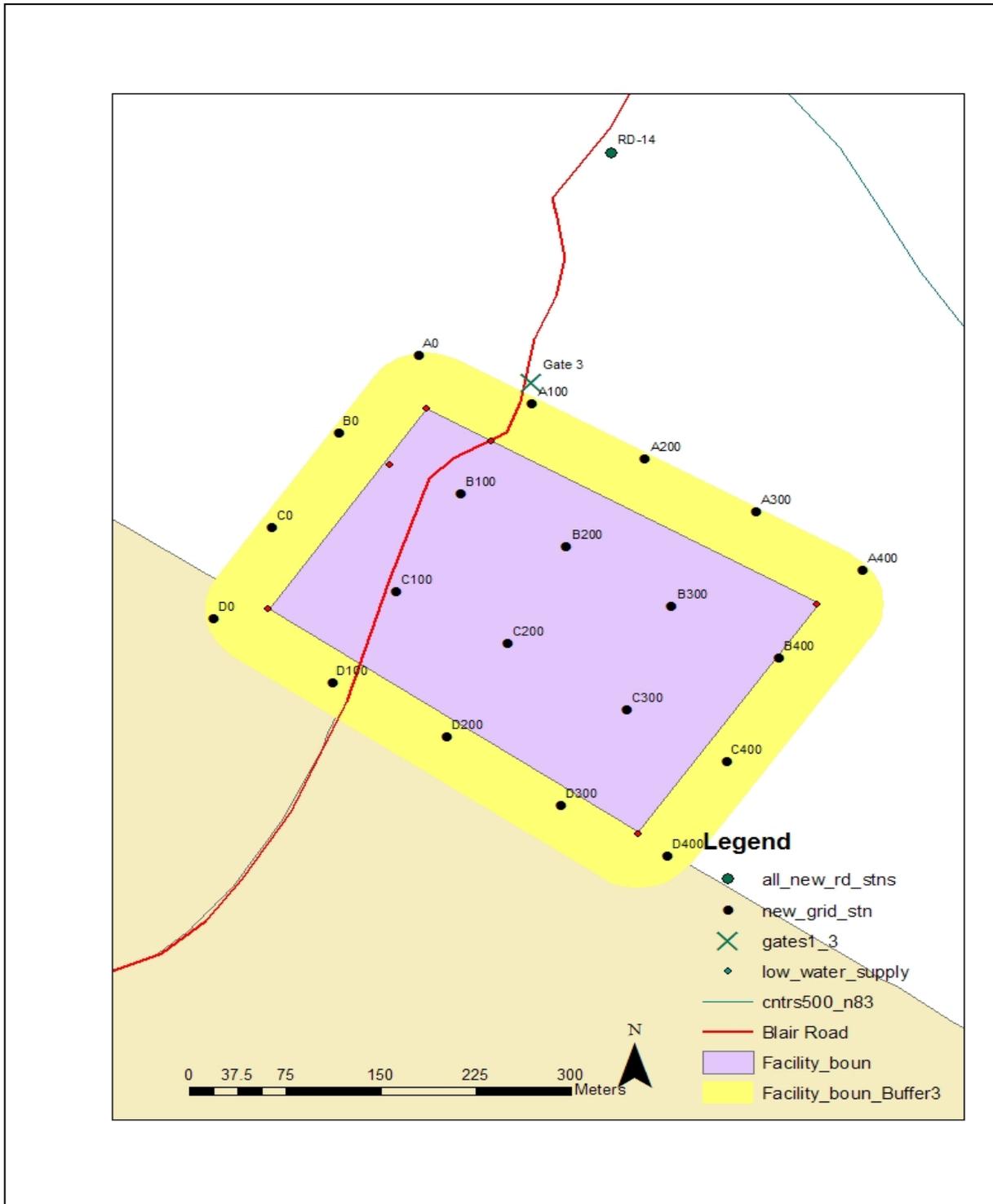
Appendix B – Table 2: University of Hawaii Bird Survey Results (Non-Native Species)

27) Species Code	28) Scientific Name (Common Name)	32) Native?
BLFR	<i>Francolinus francolinus</i> (Black Francolin)	No
COMY	<i>Acridotheres tristis</i> (Common Myna)	No
HOFI	<i>Carpodacus mexicanus</i> (House Finch)	No
HOSP	<i>Passer domesticus</i> (House Sparrow)	No
JAVE	<i>Zosterops japonicus</i> (Japanese White-eye)	No
KAPH	<i>Lophura leucomelanos</i> (Kalij Pheasant)	No
MELT	<i>Garrulax canorus</i> (Melodious Laughing Thrush)	No
NOCA	<i>Cardinalis cardinalis</i> (Northern Cardinal)	No
NUMA	<i>Lonchura punctulata</i> (Nutmeg Mannikin)	No
RBLE	<i>Leothrix lutea</i> (Red-billed Leothrix)	No
REAV	<i>Amandava amandava</i> (Red Avadavat)	No
SPDO	<i>Streptopelia chinensis</i> (Spotted Dove)	No
ZEDO	<i>Geopelia striata</i> (Zebra Dove)	No

Map 4: University of Hawaii Road Survey Points



Map 5: University of Hawaii Lease Survey Points.



Laupahoehoe National Area Reserve (NAR) Hoary Bat and Bird Data

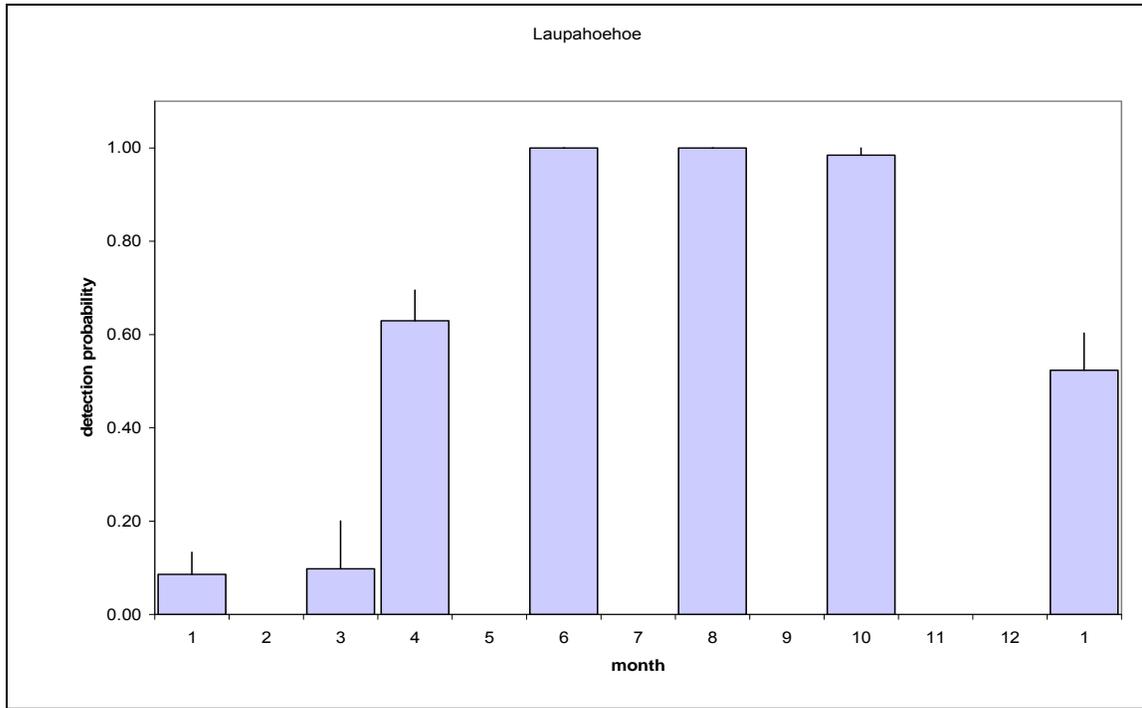
The following information bat and bird data was taken from the Laupahoehoe Experimental Forest Unit, south of the action area.

Hawaiian hoary bat data courtesy of Frank Bonaccorso, US Geological Survey. Hawaiian Hoary Bat detection probability in seven months of samples from 2007.

Month 1 = January. Detection probability 1.0 would represent all microphones detecting bats every night of sampling, 0.0 would be no detections on any microphones throughout sample. Each sample represents 6 microphones recording for one week within the sample month. Error bars equal one standard error.

At Laupahoehoe, bat activity was highest in June, August, and October among months sampled. June and August also represent “sensitive” times in the reproductive cycle for adult females with dependent young bats. Hawaiian hoary bat detection data is summarized in Table 1 below.

Figure 6: Laupahoehoe Forest Reserve Bat Detection Summary



The birds listed in Table 3 have been reported from visual and audio identification in or near the Reserve. The list includes information on rare birds, compiled from the literature. Taxonomy follows the Checklist of the Birds of Hawaii by Pyle (1988).

Appendix B – Table 3: Laupahoehoe Area Reserve Bird Species List

Status	Species	Common Name	Source
N	<i>Acridotheres tristis</i>	Common Myna	?
N	<i>Alauda arvensis</i>	Eurasian Skylark	?
+E	<i>Anas wyvilliana</i>	Hawaiian Duck, Koloa Maoli	*
E	<i>Asio flammeus sanwicensis</i>	Short-eared Owl, Pueo	?
+E	<i>Buteo solitarius</i>	Hawaiian Hawk, 'Io	*
N	<i>Cardinalis cardinalis</i>	Northern Cardinal	*
N	<i>Carpodacus mexicanus</i>	House Finch	X
E	<i>Chasiempis sanwicensis sandwichensis</i>	'Elepaio	*
N	<i>Garrulax canorus</i>	Hwamei	*
+E	<i>Hemignathus munroi</i>	'Akiapola'au	X
E	<i>Hemignathus virens virens</i>	'Amakihi	*
E	<i>Himatione sanguinea sanguinea</i>	'Apapane	*
N	<i>Leiothrix lutea</i>	Red-billed Leiothrix	*
N	<i>Lonchura punctulata</i>	Nutmeg Mannikin	X
N	<i>Lophura leucomelana</i>	Kalij Pheasant	*
N	<i>Meleagris gallopavo</i>	Wild Turkey	*
E	<i>Myadestes obscurus</i>	Hawaii Thrush, 'Oma'o	*
+E	<i>Oreomystis mana</i>	Hawaii Creeper, 'Alauahio	X
N	<i>Phasianus colchicus</i>	Ring-necked Pheasant	X

Status	Species	Common Name	Source
N	<i>Streptopelia chinensis</i>	Spotted Dove	?
E	<i>Vestiaria coccinea</i>	'Tiwi	*
N	<i>Zosterops japonicus</i>	Japanese White-eye	*

+ = Rare E = Endemic N = Non-native I = Indigenous

x = Cited in literature * = Confirmed during NARS field study

? = Cited in literature; needs confirmation in Reserve

Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii Experimental
Tropical Forest Laupahoehoe Research and Education Center Construction Project Scenery Report
Document Number: 550-1
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Approval:

Pacific Southwest Research Station- Institute of Pacific Islands Forestry-Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project

Scenery Report

Prepared by:

Marti Dodds, Landscape Architect

Recreation Solution Enterprise Team for Enterprise Technical Services

January 29, 2009

Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii Experimental
Tropical Forest Laupahoehoe Research and Education Center Construction Project

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Existing Condition

Landscape Character Description for HETF Laupahoehoe Forest Unit Facilities Site and Road

Landscape character represents distinct attributes of landform, vegetation, surface water features and cultural features that exist in the landscape. In the largest context of place, the Hawaiian Islands are considered to be one of the most unique and diverse places on earth. The extreme isolation of the islands produced, through evolution and specialization, a remarkable diversity of species found nowhere else on the planet. These natural treasures are integral elements of the biological and cultural heritage of the Hawaiian Islands and their people.

Built from a geological formation known as a “hotspot”, the Hawaiian archipelago is a string of volcanic islands which rise up from the Pacific Ocean over 3,000 miles from the nearest continental land mass. The largest and youngest is the island of Hawaii, which covers an area of approximately 4,030 square miles. Five volcanoes make up this island: Kohala (long extinct); Mauna Kea (activity during recent geologic time); Hualalai (last erupted in 1801); and Mauna Loa and Kilauea (both still active). The island is geologically very active, and Hawaii Volcano Observatory shows occasional light to moderate (Magnitudes 1 to 3) earthquake activity in the project vicinity—a dynamic element. See the geology report for more detail.

Although the project area described within the EA constitutes the 20-acre parcel of land where the research and education center facilities would be constructed and the Manowaiopae Homestead Road corridor, from the scenic perspective the project site for the Laupahoehoe Research and Education Center lies on the lower northeasterly facing flank of Mauna Kea, up slope (*mauka*) of the Hamakua coastline in the District of North Hilo. The project site is bounded by the town of Laupahoehoe and the Pacific Ocean to the northeast and Laupahoehoe gulch on the north. The summit of Mauna Kea rises approximately 13,800 feet above sea level to the southwest of the site, although views of the mountain are obstructed by vegetation, topography or both. Lava rock extrusions and overland flows create interesting texture and color in the landscape; the lava is gray to black when recent, and shades of brown on exposed and weathered surfaces.

The general area is part of one of the largest and most important watersheds on the island, the Hilo Bay Watershed, which provides fresh water to the entire city of Hilo and surrounding areas. Seven headwater streams originate in the Laupahoehoe forest unit. See Soils and Hydrology Report for further information on which streams impact the research and education facility construction project. These include two first order tributaries of Ka’awali’i Stream, Laupāhoehoe Stream, Kilau Stream, Kiwilahiahi stream, Ha’ako’a Stream, and Pahale Stream. The streams form numerous waterfalls and pools as they flow down the slope toward the bay. The coastline of the island can be divided into seven general areas; here, the Hamakua coast, from near Waipio Valley to Hilo Bay, is comprised of a sea cliff 100 to 300 feet high. Along the Hamakua Coast are boulder beaches that have formed at the mouths of valleys and the numerous gulches.

The unique geologic features, dense vegetation, and picturesque streams coursing through deep gulches to the Pacific Ocean constitute the type of remarkable scenic character deemed of high value in landscape management. The Laupahoehoe forest unit contains magnificent examples of native tropical

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rainforests and is critical habitat to numerous endangered plant and animal species. However, in some instances the existing scenic condition may not be at this level of quality due to disturbances that have occurred to vegetation or land forms. Some portions of the forest suffer from degradation due to encroachment by nonnative and invasive species. The Laupahoehoe Research and Education Center proposed building site sits on land leased from the State adjacent to the forest unit along the northeast boundary (see EA Maps 1, 2, and 3). The adjacent forest scenic values are background to the project, but the center site and areas surrounding the access road have been disturbed by agricultural activities so that the existing scenic condition is different. The proposed site has been leased for cattle pasture for decades, and although some large native trees remain, the under story is mostly nonnative plants and cultivated grasses. Because the proposed site contains more openings than the typical rain forest in the unit, it is possible to glimpse the ocean between the trees to the east while the forest unit boundary is solid vegetation.

The landscape down slope from the proposed site through which the access road passes is abandoned sugar cane plantation land. When this land was actively used for agriculture, the landscape appeared as rural/farming. Now the landscape has deteriorated into a patchwork of wild cane, pastures, and invasive grasses, with several riparian drainages as well as a stand of eucalyptus trees remaining from a failed commercial timber operation. The road winds along the slope, and as it approaches Laupahoehoe scattered Hawaiian-style houses appear on acreage lots, surrounded by a variety of vegetation types. The style known as Hawaiian plantation architecture has become a signature style for Hawaii and is the most recognizable Hawaiian style featuring low profile wood frames, vertical plank siding, and large porticos (lanais). Roofs are distinguishable parts of Hawaiian plantation structures, wide-hipped or bell cast with eaves that are deep bracketed. When viewed against the natural Hawaiian environment, Hawaiian plantation structures blend easily with their surroundings. The style gets its name from the sugar and pineapple plantations which employed the design for laborer homesteads.



All along the access road the view of the ocean is sweepingly dramatic, although intermittently obstructed by high grasses and eucalyptus trees (see photo at left). From this elevation, it is possible to watch weather fronts move in across the ocean and observe ocean vessels along their route in between islands. Ocean views, while common on all islands, are always highly valued and on the Big Island tend to increase financial value of property. The Hamakua coast, from near Waipio Valley to Hilo Bay, is comprised of a sea cliff 100 to 300 feet high; this highly valued scenic element while an extremely

important to the area's character cannot be seen from the either the road or the building site because it is below the viewing plane.

Although now a quiet village like so many along the Hamakua Coast, Laupahoehoe has a rich history, from the ancient Hawaiians to the arrival of the first Europeans in the eighteenth century through its days as a thriving center for the sugarcane industry. The ancient Hawaiians used a traditional system of land management known as *ahupua`a*, wedge-shaped divisions of land extending from the ocean upward to varying elevations on the slopes to provide the residents with access to resources from all

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Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project elevations. Laupahoehoe was comprised of 14 such *ahupua'a*, heavily forested and somewhat difficult to traverse. Most early 19th century historical accounts of the area are taken from the written observations of westerners, such as traveling missionaries and the occasional naturalist.

In the mid-1800s, the area became of great interest to businessmen looking to develop a sugar industry, and the area became a center for sugarcane agriculture and milling for 150 years. The labor-intensive production of sugar required an influx of workers, most of whom came from other parts of the world, in particular Japan and Portugal.¹ The population in Laupahoehoe remains largely comprised of the descendants of those immigrant workers, who homesteaded between the plantation lands and forest reserve. For instance, almost 20 percent of the population of Laupahoehoe today claims Portuguese ancestry². Many of those descendants worked in the sugar plantations and mills themselves until the last mill closed its doors in the 1990s.

In contemporary culture, feelings of significance for the *ʻāina* (land) are expressed by the people of Laupahoehoe. Care for the land, forest resources, and cultural sites remain important in the present day. A family organization made up of Hawaiians whose ancestors live in Laupahoehoe and neighboring *ahupua'a* are actively documenting family traditions and developing stewardship programs for their ancestral lands. More recently arrived residents, although not part of historic traditions, are also interested in maintaining the small town and rural life styles closer to natural resources, including scenic landscapes. As throughout much of Hawaii, there is in Laupahoehoe a challenge in maintaining balance between preservation of natural resources and pressure for commercial or residential developments.

Seen Area Integrity of the Access Road and Proposed Building Site

The road alignment is either on or cuts through private land, only on the State lease parcel is it on public land. The beginning of the project at the wooden bridge is at the very edge of the residential development of the town of Laupahoehoe. Residential buildings are typical of local architecture. The road itself (see photo at right) is the viewing plain from which the narrow corridor is observed, views of the surrounding fields, and out to the ocean occur intermittently but the vegetation at the lower elevations and through the eucalyptus plantation creates a “hall” type of view. The road winds considerably creating a sinuous feeling as the viewer passes through. As the road reaches the project site it opens on to more forested landscape, one more open than the natural forest because it is maintained and used as pasture. The last structure on the road is 1.5 miles uphill (*mauka*) from the bridge; fencing, gates and occasional rusting equipment left from the cane plantation dot the corridor. Cows stand and walk on the road, as do wild pigs; birds can be



¹ Paraphrase from Hilo Paliku – Hilo of the Upright Cliffs: A study of Cultural-Historical Resources of Lands in the Laupahoehoe Forest Section, Ahupuaa of the Waipunalei-Maulaunui Region, North Hilo District, Island o Hawaii. Kumu Pono Associate LLC, 2006.

² [Http://www.city-data.com/city/Laupahoehoe-Hawaii.html](http://www.city-data.com/city/Laupahoehoe-Hawaii.html)

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seen all along. The valued view from the road and adjacent properties is north and sometimes northeast to the ocean.



The proposed project building site (see photo above) is also pasture and thus more open than the forest unit—the wall of thick vegetation along the Laupahoehoe forest unit boundary is visually evident, dark, and unwelcoming, and the more open views of meadows with individual and clumps of trees is a main characteristic of the site. Herds of cows stand and move across the site because a watering pond is in the south quadrant, often the ground is disturbed by the cows or wild pigs. Internal views on the site are of Ohia and Pisonia trees, guava, shrubs and grass grazed to a few inches. It is possible to see out to the ocean from several points within the 20 acres, the view is limited and at a distance, but on a clear day an amazing spot of periwinkle blue. The terrain slopes moderately toward the north/northeast with two small drainages that are rutted with lava protruding along the edges, but the outcrops are not features because they are covered by vegetation and common in this landscape. The Hamakua Coast, while an extremely important to the area’s scenic character, cannot be seen from either the road or the building site because it is below the viewing plane. The valued view is the native vegetation.

Laws, Regulation & Policy

The State of Hawaii’s planning directions³ state an action will have a significant effect if it “substantially affects scenic vistas and viewpoints identified in state or county plans or studies”. Therefore, the Hawaii County regulations identifying and guiding scenery management are important to this evaluation. The Hawaii County General Plan⁴ states in Chapter 7-Natural Beauty: “Natural beauty is a multifaceted resource. It is an aesthetic resource experienced by human perceptions. It is an economic resource, as evidenced by the scale of resort development and by visitor-related activities. Real property values further substantiate the economic value of Hawaii's dramatic beauty.” Also, further in the introduction it says landscapes are “fragile and although often enhanced by man can easily be adversely affected. Measures must be taken to insure its protection, both now and in the future, for the enjoyment of Hawaii's residents and visitors.” General plan items that relate to evaluation of action alternatives include:

7.2 Goals: (b) - Protect scenic vistas and view planes from becoming obstructed

³Hawaii Administrative Rules title 11, Dept of Health, chapter 200, sub chapter 6 , line (b) item 12

⁴ Hawaii County General Plan

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7.3 Policies: (b) Develop and establish view plane regulations to preserve and enhance views of scenic or prominent landscapes from specific locations. (e) Develop standard criteria for natural and scenic beauty as part of design plans

7.4 Standards: (b) Coastline areas of striking contrast, e.g., Laupahoehoe Point.

7.5 Districts, North Hilo: “One of the most outstanding areas of natural beauty in North Hilo is Laupahoehoe Point. The point juts out calmly, ending in a rugged coastline with pounding surf in either direction along the coast are views of the high cliffs. The deep gulches with silvery green Kukui trees contrasting with the darker green vegetation along the highway are also points of natural beauty”.

Kilau Gulch and Laupahoehoe Gulch are listed in North Hilo district as “Natural Beauty Sites” these gulches essentially bracket the project road and building site and are part of the setting for the project.

In Chapter 11, Public Utilities, part 4 Electricity also contains reference to scenic quality:

11.4.2 Policies (a) Power distribution shall be placed underground when and where practical.

11.4.3 Standards (a) There shall be minimal obstruction of scenic views and vistas by electrical facilities.

The Forest Service scenery management direction does not officially apply because the land is not federally under Forest Service management; however, because the Forest Service is a cooperating partner in HETF the FS Scenery Management System (SMS) has been applied as a descriptive and organization scheme for the project evaluation. The land management partner, State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife does not typically evaluate and manage scenery but incorporates county rulings when appropriate⁵.

Mitigation and Management Recommendations

Public scoping identified an issue existed regarding powerlines in view plane of local landowners. This issue was considered to be significant enough that it was incorporated into the design of Alternative 2: electrical power lines would be buried in the location where they cross the most sensitive view; the view to the north/northeast, perpendicular to the road and powerlines following the road looking at the ocean. In addition there are recommendations concerning management for this project: When pruning trees and vegetation adjacent to the road for clearance, vegetation should be feathered and trimmed to various heights in undulating lines to replicate natural growth patterns. When trees are removed from the building site, it is important to avoid dragging boles over the existing road banks. Landscape contours changed by tree removal or construction should be restored to natural shape, and disturbed areas should be reclaimed by planting or seeding with natives. Generally, it is important in all pruning, ground disturbance, or revegetation to avoid straight lines or even spacing of trees. Residue or slash should be removed from the building site and grounds; however, some plant material can be crushed and spread so that it appears like natural ground cover. Buildings proposed should follow the locally

⁵ Conversation with Lisa Hadway, Natural Area Reserve manager for the Island of Hawaii, 1/23/2008.

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accepted and encouraged plantation architectural style and use carefully muted, blending colors, textures and forms so that the development would be suitable for the locale and relate visually to the town.

Scenic Analysis- Methodology and Impact Definitions

The evaluation relies on field studies and photography from inventoried viewpoints and other views of the project area, as well as consideration of public preferences for scenic quality. Scenery is valued by the State, county, the local community and is important to the Hawaii Experimental Tropical Forest.

Analysis Issue: *Natural landscape appearance without obstructions or anomalies.*

Indicators: Natural appearing scenery; intrusion of visual anomalies; and changes to existing roadsides and forest landscape.

Impacts Defined

Types of Impact

Adverse: Activities that lead to the temporary intrusions in to the scenery, or long-term change in scenic integrity of the vista; and/or temporary presence of mechanical equipment in a localized area.

Beneficial: Activities that enhance the scenic experience including: opening of vistas and opportunities for enhancement to the scenery by increasing native vegetation.

Intensity of Impact

Negligible: A majority of all viewers would not notice any effects or changes in scenic patterns and the effects would not change their experience of visual resources and values. There would be little noticeable change in visual experience. Mitigation would not be necessary. The visual resources would not be affected or the level of detection would be slight or barely perceptible with little consequence to the visitor experience.

Minor: The desired visual experience would be changed, but without appreciably limiting or enhancing critical characteristics of the experience such as intrusions in scenery or impacts to visual resources. If mitigation was necessary to offset adverse effects, it would be relatively simple and would likely be successful.

Moderate: Impacts to the desired experience would be readily apparent and widespread. The quality of the scenery would be diminished slightly.

Major: Impacts would eliminate, detract from, or greatly enhance multiple critical characteristics of the desired visual experience. Effects to the visual resources would be very obvious, widespread, and long term. There would be substantial consequences to the scenic experience and satisfaction would decline substantially. Mitigation would be complicated or not possible.

Context of Impact

Regional: Impacts would be realized concurrently at several sites and/or locations.

Local: Impacts would be realized at specific sites or locations (e.g., developed areas, trails, campgrounds, overlooks, roads).

Duration

Short-term impacts would be realized for a few days to a year.

Long term impacts would be realized for more than a year.

Environmental Consequences

Alternative 1 – No Action

The no action alternative would result in no immediate, discernable change to the visual resource and little perceived change for the future. The existing road corridor would remain as is with no improvements and the proposed site would stay as pasture/forest. Without the proposed intense maintenance improvements to the road it would decline further, increasing the deteriorated appearance of the road.

Alternative 2 – Proposed Action

Multiple buildings, parking lot, helipad, infrastructure, and utilities proposed on 1.5 to 3 acres in the 20-acre site would change the appearance in the foreground from forested pasture and native tropical forest to that of rural development (see attachment BA for appearance simulation). The desired scenic character for the project area includes two elements: the blending of built structure into the forest surroundings so as not to diminish the natural aesthetic, and to use an architecture style fitting into the Laupahoehoe (Lava Leaf) place including the nearby rural community. If the buildings proposed follow the locally accepted and encouraged plantation architectural style and use carefully muted, blending colors, textures and forms, the development would be suitable for the locale and relate visually to the town. This area has a very limited viewing audience: a few ranchers and hunters, and the research scientists. In the future, access would remain limited (not public) and the majority would be the scientists, researchers, educators and their audiences using the structures. The effect is long term, local and major to the immediate foreground. Middle and far ground views have no effect because the vegetation and topography screen the site from view. There are similar built environments nearby (2 to 4 miles) and if more development is deemed undesirable then the change would be considered adverse; alternatively, if the change is deemed appropriate based on the desired research facilities and in keeping with the rural atmosphere of the locale then the change would be considered beneficial. Revegetation with native plants, removal of invasive species in the site and limiting the removal of large trees would be a beneficial, long term effect to scenery.

Electric power lines installed in the road right-of-way from the connection point to the beginning of the project (approximately 1,000 feet), then to the proposed development site would place poles and lines in the immediate view of visitors traveling the road, but more importantly intruding into the scenic view from properties along the road. These views are valued at all times and seasons by residents, visitors, researchers and educators alike; these audiences though not large in numbers, have a keen interest in the scenery. This has been identified as an issue for this project. Various county directives include value statements for scenery specifically stating in a subchapter on electric lines that poles and lines should avoid interrupting scenery when possible.

From the connection point to the wooden bridge (approximately 1,000 feet), then in the project area from the bridge to the low water crossing, lines and poles in the right-of-way would be an adverse, minor, long term change to the visual environment. Such lines already exist in the neighborhood, the views are common of the character type and primarily obscured from the road to the ocean, not across the road from adjacent properties. The electric power from the low water crossing to the sharp turn up the slope (approximately 1,751 feet or 0.33

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mile) would be under ground and have no effect to the view along the road, or any effect in the scenic view from the properties up from the road with views to the ocean. From the turn, running up-slope to the proposed building site the lines and poles in the right-of-way would be an adverse, long term, moderate change to the visual environment; there are not now any utilities nearby and the linear element would change the road side appearance and add a built image to the environment. Where the poles are within the eucalyptus plantation they would not be evident because they would blend with the trees. In this location pruning for the lines should follow the management recommendations (see above) to limit impacts. From the plantation to the building site in the more natural forest the pole and lines would again add the linear, unnatural element to the view, adding a utility appearance. As stated in the paragraph for the building site the viewing public is limited above the first gate the majority would be the scientists, researchers, educators and their audiences. Below the gate there would potentially be more public view especially by local residents, but total viewers are still a small number.

The solar panels located on rooftops and standards within the developed site would not impact scenery more than the effect of the buildings and infrastructure as discussed above. The separate location of the wind generator in the pond area of the site would be observed by few in the immediate foreground, but the size is scaled to the standing tree scale and would be a moderate, adverse, long-term effect to the scenery in the immediate foreground. The generator would not be seen in the middle or far ground due to forest screening; thus no effect. See Attachment A for a photo comparison.

Improvements to the road surface would be beneficial but negligible in regard to scenery because the appearance of the road would not change in view of the common observer and the road is not part of the scenic view. The low water crossing would be a beneficial, long-term effect—the added safety features of water depth indicators and a safer road bed would be seen by motorists as improvements.

Cumulative Effects. The EA contains a description of past actions and current conditions within the corridors. Cumulative scenic quality is within the seen area of the proposed site boundary and the road corridor from the electrical connection to the building site. There would be no cumulative effects to the foreground, middle ground or far ground views from this alternative combined with those actions. The potential increase in linear forms with additional towers encountered in the forest is a change in the natural appearance, but the thick vegetation cover conceals them except for the immediate foreground at the site of each tower so the change remains negligible, though long term. Any actions regarding vegetative management resembling natural condition for this land adjacent to the LHH forest unit would be beneficial, long term and regional.

Alternative 3

The effects of this alternative would be consistent with the effects cited in Alternative 2, except that electric powerpoles and lines from the wooden bridge to the sharp turn heading up hill (approximately 1,751 feet or 0.33 mile) would be a long-term, moderate adverse effect to the view along the road and a long term, major, adverse effect to the scenic view from the property paralleling the road with views north/northeast to the ocean. The existing view from the property along this stretch is now clear to the ocean, and because the terrain slopes dramatically down from the road there is no potential of other intrusions into the view. The terrain does slope upward, south from the road and at higher elevation the view plane would be above the height where poles and lines would be seen. The determining factor for this evaluation is the view plane from within 50 feet of the road. See Attachment A for comparison of existing views and views with poles and lines.

Cumulative Effects. Cumulative effects would be the same as Alternative 2.

Alternative 4

The effects of this alternative would be consistent with the effects cited in Alternative 2, except that there would be no impact to scenery from the installation of electrical lines and poles along the road or at the site. Generator for electrical power located within the developed site would not impact scenery more than the effect of the buildings and infrastructure as discussed in Alternative 2 (first paragraph).

Cumulative Effects. Cumulative effects would be the same as Alternative 2.

Alternative 5

The effects of this alternative would be consistent with the effects cited in Alternative 2, except that there would be no impact to scenery from a wind generator tower in the pond area..

Cumulative Effects. Cumulative effects would be the same as Alternative 2.

Scenic Analysis - Laupahoehoe research and Education Center
Attachment A

Proposed building site images



The top photo above is from the proposed building site showing the natural, open forested scene. The lower photo is a photo simulation showing the scenery with a building and parking as proposed for the Research and Education Center. This is only part of what would be constructed on the site.



This photo is of a residence in Laupahoehoe on the road to the proposed Center site showing how the buildings could be similar to local rural style.

Road and electric line images



Above are typical views of the highly scenic earth, ocean, sky; these views are found along the road look north and northwest from the power line connection point to the place where the road enters the eucalyptus plantation.



Above are views from the vicinity of the project of the same scenery showing the view with electric lines installed. These linear elements, while commonly found in the rural locale of the project, are an unnatural intrusion into the scenic view plane.



Above on the left is a scene from the road at the top of the slope just before the road turns up hill as it exists, on the right is a photo simulation showing how it would look with poles and lines in the view.

Pond with wind generator turbine and tower image



This photo simulation illustrates how a wind turbine tower would appear in the pond site.

Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii Experimental Tropical Forest Laupahoehoe Research and Education Center Construction Project Archeological Assessment
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An Archaeological Assessment of

Pacific Southwest Research Station - Institute of Pacific Islands Forestry - Hawaii
Experimental Tropical Forest Laupahoehoe Research and Education Center Construction
Project

In the Ahupua'a of Laupahoehoe
District of North Hilo
Island of Hawai'i, Hawai'i
[TMK (3) 3-6-06:046]

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Introduction and Summary

At the request of the Hawaii Experimental Tropical Forest (HETF), USDA-Forest Service TEAMS Enterprise Unit archaeologists conducted an archaeological assessment of the potential effects from the proposed construction of a research and educational center. The proposed facility is within the Ahupua‘a of the Waipunalei-Mauluanui Region, North Hilo District, Island of Hawaii (TMK 3-3-6-06:046). A portion of the road leading to the facility site was also surveyed for the proposed installation of utility lines, and a small road improvement at a low water crossing. Due to previous disturbances and the lack of cultural and historical resources, neither the utility line installation nor the low water crossing should be considered an undertaking.

Field work was conducted December 5–8, 2008, by Robert Nykamp (Archaeologist) and Eric Pope (Archaeological Technician) of USDA-Forest Service TEAMS Enterprise Unit, Heritage Department. Approximately 25 acres were intensively inventoried for the area surrounding the proposed facility construction and approximately 5 acres were intensively inventoried along the proposed road corridor and low water crossing. The results of the inventory are negative—no historic or cultural resources were located. The chassis of a 1963 Ford Galaxie sedan, abandoned post 1969, is noted. It is recommended that this be removed and properly disposed of because it may contain hazardous material.

Project Location

The area of the proposed facilities is located in Hawaii County, 3.7 miles south-southwest of the town of Laupāhoehoe. The site is located on State-owned land under the A-20 zoned district. A 20-acre parcel lease has been established between the State of Hawaii and the USDA-Forest Service for the construction of these site facilities (see Figure 1). Access to the project area (Figure 2) is restricted by locked gates.

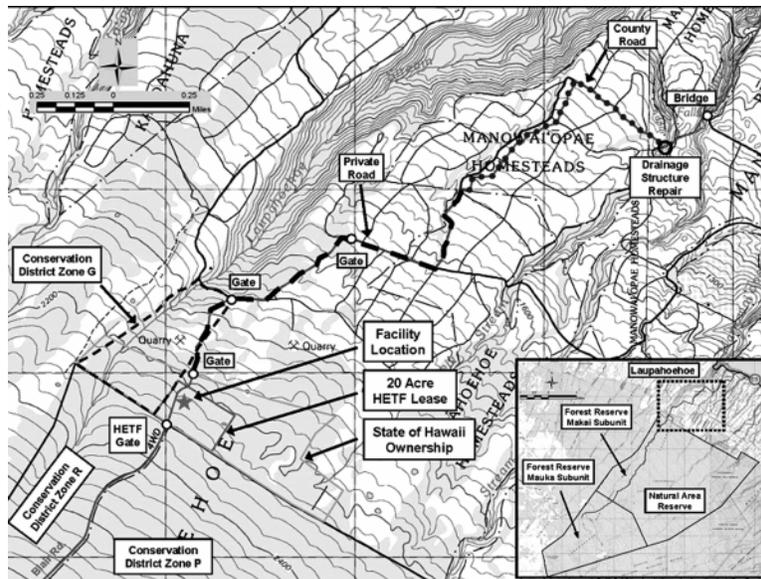


Figure 1: Project Location Map (courtesy Dr. Julie Laufmann, USDA-Forest Service)

From the intersection of Highway 19 (Hawaii Belt Road) and Manowaiopae Homestead Road, proceed in a southwesterly direction on the Manowaiopae Homestead Road approximately 3.7 miles (note that the road name and ownership change along the route, eventually becoming Blair Road after it passes through the proposed facility location).

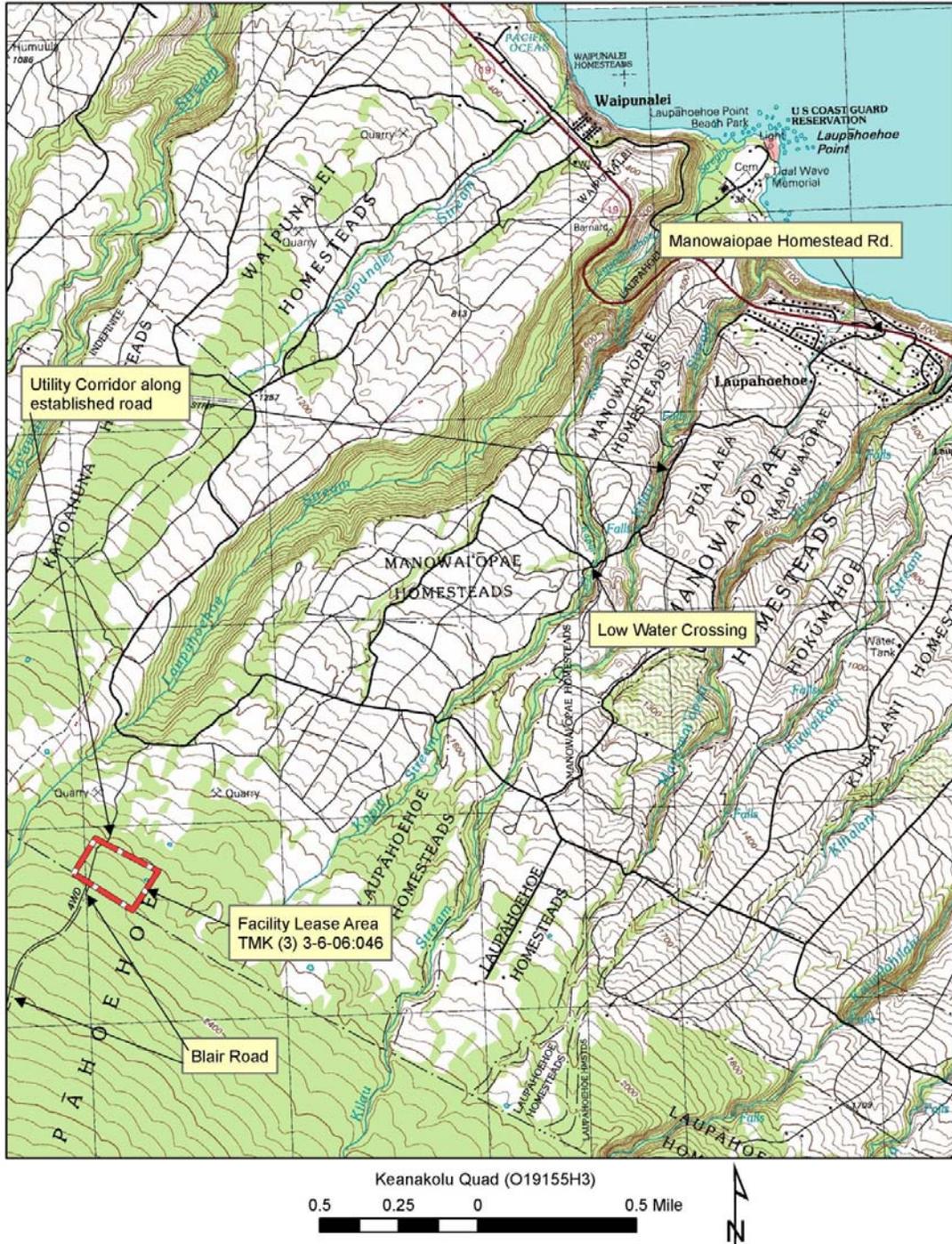


Figure 2: Project Location Map Overview and Cultural Resources Survey Coverage

Purpose and Need for Action

To meet its full potential as a site for research, education, and demonstration, construction of new research and education field station facilities is needed. The purpose of the Laupāhoehoe Facility Construction Project is to provide facilities that will support HETF research, demonstration, and educational functions serving the entire Pacific Basin. Facilities that meet these purposes are not currently available at the Laupāhoehoe site.

Construction of these facilities would include infrastructure development to support an educational facility, housing for approximately 20 people, and improvements to the road accessing the property.

Environmental Setting

The Laupāhoehoe Experimental Forest Unit is located on the windward side of the Island of Hawaii on the slopes of the Mauna Kea Volcano. The 5,000 hectare site contains magnificent examples of primary wet and rain forest and is the habitat to numerous endangered plant and animal species. A total of 234 vascular plants (native and nonnative) have been identified. Among them, 12 are considered rare (known from fewer than 20 locations worldwide or less than 3,000 individuals). Twenty-two bird species (native and nonnative) have been observed, including four federally-listed endangered bird species.

The Laupāhoehoe Unit contains native-dominated forested landscapes from lowland forest at 700 meters above sea level extending through four Holdridge life zones to almost 2,000 meters in elevation. Average annual rainfall of the unit is about 4,000 millimeters. The unit is part of the largest remaining native dominated forest in Hawaii. Forests are largely dominated by ‘Ōhi‘a (*Metrosideros polymorpha*) and koa (*Acacia koa*), the two most widespread tree species in native forest remaining in Hawaii. In addition, the landscape includes plantations dominated by tropical ash (*Fraxinus uhdei*) and eucalyptus (*Eucalyptus* spp.), degraded pastures, abandoned sugar cane fields, and sites dominated by invasive plants and animals. Invasive flora include strawberry guava, clidemia, melastomes, vines, and grasses; invasive fauna include pigs, rats, various birds (terrestrial) and fish, shrimp, and caddisflies (aquatic). Seven headwater streams originate in the experimental forest; these provide excellent opportunities to conduct hydrologic and aquatic ecology studies. Streams in the site include two first-order tributaries of Ka‘awali‘i Stream, Laupāhoehoe Stream, Kilau Stream, Kiwilahiahi Stream, Ha‘ako‘a Stream, and Pahale Stream. Three distinct and continuous soil substrates of differing ages occur along broad elevational ranges.

Elevations below this site are privately owned, and adjacent lands at upper elevations are administered by Department of Hawaiian Homelands and the Division of Forestry and Wildlife. Locating an experimental forest within this framework provides researchers with a globally unique opportunity to study environmental gradients from the upper limits of agriculture at lower elevations through eight life zones terminating at alpine at almost 4,267 meters in elevation.

Currently, there are no facilities located at the Laupahoehoe Unit; however, future plans include building dormitories, dry labs, and offices onsite. This report focuses on a potential three-acre building site located within a 20-acre leased area at the northern extent of the Laupahoehoe Unit, minor road improvements leading to the proposed facility, and installation of a utility corridor within the existing road corridor.

Alternatives Considered

Alternative 1 (No Action)

No facility construction or road repair.

Alternative 2 (Proposed Action—Green Alternative)

The proposed action includes the following activities for facility construction:

- Two to three housing units (20 person sleeping quarter capacity) with centralized facilities, one caretakers living unit, one administrative unit with teaching and meeting rooms, utility storage buildings, rooftop water collection systems, permanent vehicle wash stations and a parking area (20 vehicle capacity). The parking area may serve as a helipad site, or may be constructed within the facility footprint depending on site design. Infrastructure development associated with construction would include trenching at specific locations within the facility footprint for electrical, propane for cooking, and septic systems. Depths of trenching would comply with all State and county regulations. Footprint of these facilities is approximately 1.5 to 3.0 acres.
- Fencing for security and cattle/wild ungulate exclusion would be installed around the 1.5 to 3.0-acre facility site. Preparation of the fence corridor would involve trimming of vegetation with hand-operated tools (i.e., handsaw, machete, weed eater, chainsaw) from a 6 foot wide corridor. A 4 to 6 foot-high fence would be constructed using hog wire or chain link fencing supported by wooden or steel fence posts. The top wire of the fence would be smooth to reduce any chances of injury to birds or bats. To ensure control of wild ungulates some barbed wire fence may be used and fencing mesh size may be more tightly woven closer to the ground and buried to control nonnative predators. The fence would avoid any major geological, rare biological, terrestrial, or archeological/cultural features as determined by the archeological and biological surveys.
- All efforts in facility design would preserve existing native Ohia (*Metrosideros polymorpha*) and Papala Kepau (*Pisonia umbellifera*) trees. No more than 5 percent of native trees are expected to be necessary for removal for facility construction and safety concerns. Revegetation with native plants would occur in areas disturbed by construction activities within the facility footprint. Small native plant demonstration gardens for educational purposes may also be constructed and located within the facility complex footprint.

- Power for the facilities would be supplied by extension of electrical lines from existing service adjacent to Manowaiopae Homestead Road. Portions of electrical service would be buried between to mitigate visual impacts.
- Alternative energy power sources would be installed to supplement energy needs for facilities. Wind and solar alone cannot supply all power necessary for the proposed facilities; however, a wind generator and solar panels would be placed near or on facility structures to supplement energy needs and reduce usage from other power sources.
- Limited road improvements such as grading to smooth out rough areas, and resurfacing in some areas would occur along Manowaiopae Homestead Road. Minor road realignment at the Kapili Stream crossing would provide safer passage during high water events and eliminate other safety concerns related to existing road undercut. A 12+/- foot shift of the roadway from the center of the Kapili Steam road crossing and for the next 25 feet (traveling up the road) would improve the horizontal curve and also move away from an existing under cut. The elevation of the road may change slightly, but would match the stream on the high side maintaining the same flow capacity.

Alternative 3 (Power for Facilities from Overhead Powerline)

Same as the proposed action alternative (Alternative 2), except power to the facilities would be above ground. The powerline would run parallel to the Manowaiopae Homestead Road within the road right-of way.

Alternative 4 (Power for Facilities from Propane Generation)

Same as the proposed action alternative (Alternative 2), except main power for the facilities would be generated by an onsite propane generation system. No extension of powerlines from existing service would occur. Some above ground electrical lines within the facility footprint (1.5 to 3 acre site) may occur at specific areas to provide service.

Alternative 5 (No Wind Turbines as Supplemental Power Supply)

Same as the proposed action alternative (Alternative 2), except wind turbines would not be installed.

Existing Condition

Historically, the lowlands of the Laupahoehoe Region, and the areas covering fourteen ahupua‘a, became the focus of sugar plantation efforts as early as the 1850s. But it was not until 1876 that a full-scale plantation was incorporated, and a mill established (Kumu Pono Associates 2006). The Laupahoehoe Sugar Company and Mill secured fee-simple and lease-hold interest in lands of the Laupahoehoe vicinity. As the plantation developed, lowland forests up to about the 2,000 foot elevation were cleared for cultivation of sugar and for the development of flumes and water resources (Kumu Pono Associates 2006). As a part of the plantation development, and the efforts of the government to encourage settlement in the Laupahoehoe vicinity lands, homestead lots

were also developed, and the lower boundaries of the forest reserve lands where the 20-acre leased parcel is located mark the edge of the homestead lots (Laufmann 2009).

This basic geographic setting of the project site where the facilities are proposed includes a 20-acre parcel located at approximately 2,300 feet elevation. The Manowaiopae Homestead Road begins at approximately 1,000 feet in elevation and traverses up to the facilities construction site. Adjacent land is primarily private, and state owned with scattered agricultural uses (Laufmann 2009).

The vegetation along the road accessing the administrative facilities is mostly open pasture dominated by introduced grasses with nonnative trees and a few occasional native trees scattered throughout. A portion of the road corridor runs through a stand of planted *Eucalyptus grandis* (Laufmann 2009).

The vegetation within the 20-acre leased parcel is a mosaic of scattered native trees (*Metrosideros polymorpha*, *Pisonia umbellifera* and *Acacia koa*) with thickets of nonnative trees (*Toona ciliata*, *Grevillea robusta*, *Psidium cattleianum* and *Ficus macrophylla*). Open areas are dominated by pasture grasses. The area where the 20-acre leased parcel is located has been actively grazed with cattle for the past 30 years (Laufmann 2009).

A botanical survey of these areas was conducted October 13, 2008, by Lyman Perry, Hawaii District Botanist, Division of Forestry and Wildlife, and can be found in the Laupāhoehoe Research and Education Center Construction Project Biological Assessment and Botany Report (Laufmann 2009).

Methodology

There are three areas investigated for this project in support of the proposed alternatives. All three areas have experienced some sort of modification and/or impacts in recent times up to the present.

The first area investigated is the facility site. The proposal is within a 20-acre lease that has been used extensively as a cattle pasture. Within the last 30 years, tenants have bulldozed two-tracks and all-terrain vehicle trails, excavated a stock pond, and generally modified the vegetation by removing the over-story and planting pasture grasses. Mineral licks have been placed in the grazing unit. Signs of feral pigs (rooting, wallows) were also noted.

The second area investigated is the proposed utility corridor leading to the 20-acre lease. The utility corridor would begin where the current utility line stops, and follows the Manowaiopae Homestead Road leading into the 20-acre lease. The road is paved in the lower section and becomes progressively rougher as it proceeds south, but has been, and is, a maintained road. By the time the road reaches the 20-acre lease, it consists of native surface and graveled material. The road prism has been ditched in spots. Water crossings have been modified by the use of cement and/or tar pour-offs. The corridor is fenced for most of the distance.

The third area of investigation is the proposed alteration of an existing low-water crossing of Kapili Stream. The crossing would be slightly modified to improve access and egress to the site for safety considerations; the current crossing becomes impassable during high-water episodes.

A cultural-historic resources study was prepared by Kumu Pono Associates (Maly and Maly 2006). This document references the ethnographical and historic uses of the region, and identifies several historic, ethnographic, and archaeological site types and features that may be found in the proposed project area. A copy of this report is on file with the Department of Land and Natural Resources-State Historic Preservation Division in Hilo. No cultural concerns or issues specific to the proposal were identified. They also include several recommended procedural steps, as follows:

“In regards to work which may be undertaken in the proposed Laupāhoehoe [Hawai‘i Experimental Tropical Forest] HETF, it is important that cultural resources—both tangible and intangible—be respected.

“We recommend that the HETF program managers and field crew members meet with a Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) staff person, prior to undertaking any work on fence lines or other ground altering activities. All field crew members employed on any projects in the preserve should be informed of Historic Preservation Guidelines, and made aware that if any stone features (such as walls, terraces, mounds, platforms, shelters, caves, trails or boundary ahu) are found, work in the area is to be stopped and modified so as to minimize impacts on such features. The management staff should also monitor all clearing as it is undertaken, to ensure proper treatment of sites, should any be discovered. Should cultural sites be encountered, it is recommended that members of the Hawaiian community at Laupāhoehoe —such as Nā Waiwai o Laupāhoehoe —be contacted, and consultation regarding site treatment should be undertaken along with representatives of the DLNR-SHPD.

“The Hawai‘i State Historic Preservation Statute (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of ongoing cultural significance; the criteria, standards, and guidelines currently utilized by the DLNR-SHPD for the evaluation and documentation of cultural sites should be complied with. The Hawai‘i Island Representative of DLNR-SHPD should be notified of any findings, when made.

“If inadvertently discovered, burial remains should be protected in place. Work in the immediate vicinity of the remains should be terminated, and the Hawai‘i Island Representative of DLNR-SHPD should be notified of any findings. Final disposition of remains will be determined in consultation with DLNR-SHPD, and Native Hawaiian descendants of the families associated with Laupāhoehoe and adjoining lands. If any burial remains should be discovered, they should be treated on a case-by-case basis in concurrence with Chapter 6E-43 (as amended by Act 306)” (Maly and Maly2006, page 6).

Design Criteria

Per the recommendations of Maly and Maly (2006), the following design criteria were developed and followed to guide the cultural resources assessments for this project, and are incorporated into the environmental assessment (EA). Following the design criteria would also mitigate effects should an inadvertent discovery occur during project activities.

- Prior to any land disturbing activities, and in consultation with the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD), a systematic and intensive archaeological inventory will be conducted, using the Kumu Pono (op. cit.) document as a baseline starting point.
- Should cultural sites within the proposed activity areas be encountered, members of the Hawaiian community at Laupāhoehoe—such as Nā Waiwai o Laupāhoehoe—would be contacted, and consultation regarding site treatment would be undertaken along with representatives of the DLNR-SHPD.
- The Hawaii State Historic Preservation Statute (Chapter 6E) affords protection to historic sites, including traditional cultural properties of ongoing cultural significance; the criteria, standards, and guidelines currently utilized by the DLNR-SHPD for the evaluation and documentation of cultural sites shall be complied with. The Hawaii Island Representative of DLNR-SHPD will be notified of any findings, when made.
- If any burial remains are discovered, they will be treated on a case-by-case basis in concurrence with Chapter 6E-43 (as amended by Act 306). Final disposition of remains will be determined in consultation with DLNR-SHPD, and Native Hawaiian descendants of the families associated with Laupāhoehoe and adjoining lands.
- Should evidence of any archaeological or culturally significant sites be encountered during construction, vegetation clearing and fence construction, work in the immediate vicinity of the findings will be terminated, and the Hawaii Island Representative of DLNR-SHPD will be notified.

Consultation and Background Research

Consultation with the Hawaii Department of Land and Natural Resources, State Historic Preservation Division (SHPD), began August 14 and November 17, 2008 (Donham 2008, *personnel communication*). Basic survey protocols and SHPD documentation requirements were discussed. On December 4, 2008, a visit to the SHPD office in Hilo was made by Nykamp and Pope. With the assistance of SHPD Archaeologist Theresa Donham, land commission awards for the area were sought; no kuleana were registered within the project area. The Land Grants section of www.waihona.com, Laupāhoehoe, was searched and no records located. A review of the SHPD atlas, including the Keanakolu and surrounding USGS quadrangles, showed that no previous surveys or recorded resources were known for the project area or within the immediate vicinity.

Sites along the coast in the Laupāhoehoe area were noted, as were two noneligible historic sites approximately 2 miles south and west of the proposed project area.

As described earlier, a cultural-historic resources study was prepared by Kumu Pono Associates (Maly and Maly 2006). This document references the ethnographical and historic uses of the region, and identifies several historic, ethnographic, and archaeological site types and features that may be found in the proposed project area.

Based upon the background search and the report by Maly and Maly (2006), the expected site occurrence for the project area was low, primarily due to previous disturbances (plantation and grazing activities) and the project location (transitory between the coast and mountainous regions). No cultural concerns or issues specific to the proposal were identified by the Kumu Pono Associates study. The project area was primarily used in a way that would not leave an archaeological record, such as harvesting trees or collecting flora and fauna. Other uses that have the potential to leave an archaeological record include, but are not limited to, well-worn and/or maintained trails, shrines or burials.

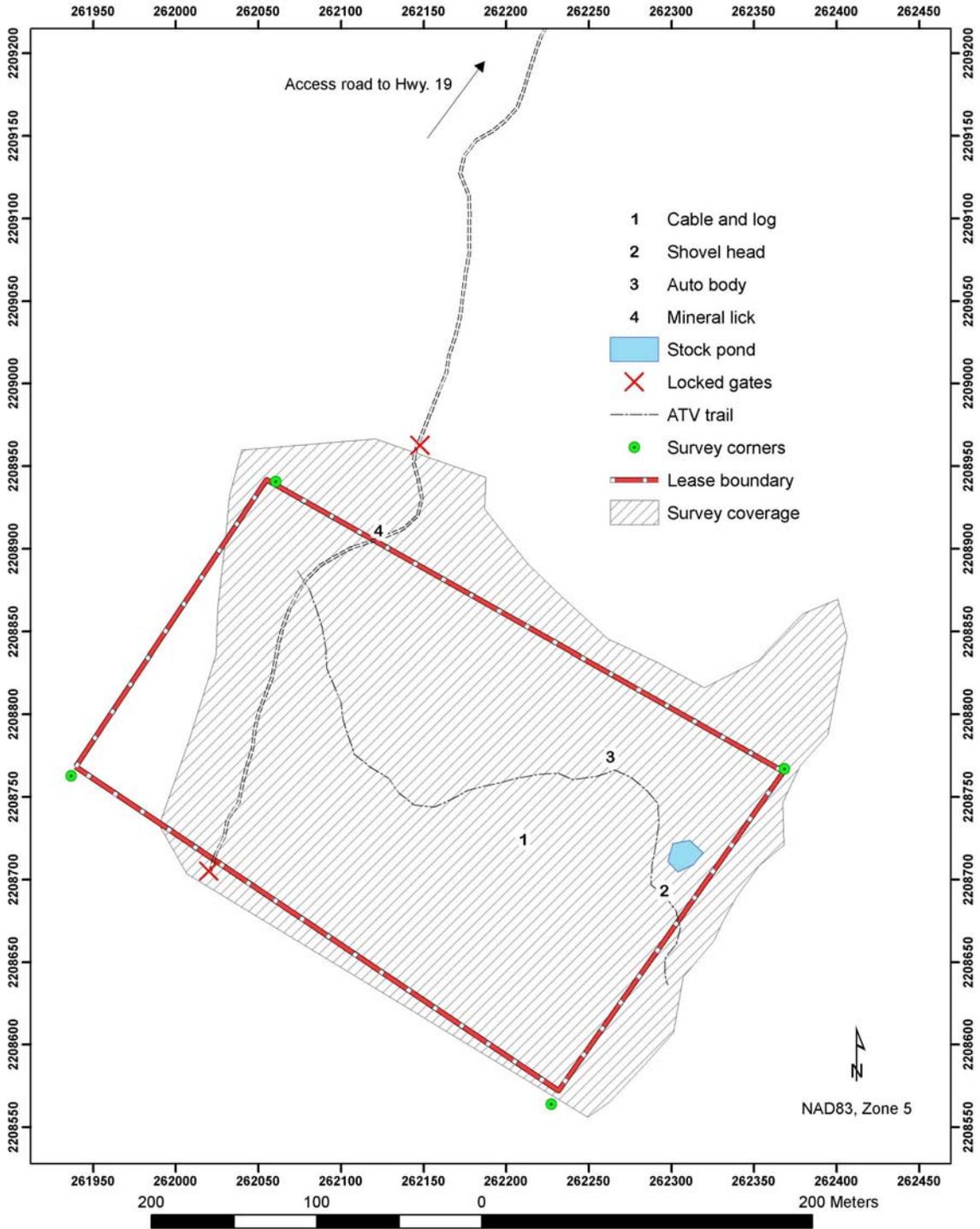
Several features were noted during the field work (see Survey Coverage section, below). In further consultation with the Hilo SHPD (Donham, *personal communication* December 8, 2008), it was determined that these features are of recent vintage (post 1969), and are not considered historically significant. As a result, no cultural or historic properties were identified within the area.

Survey Coverage

100% intensive surveys were conducted in three phases. The first phase covered the proposed lease area; the second phase covered the proposed utility corridor, and the third phase examined the low-water crossing of Kapili Stream.

On December 5, 2008, surveys began with the 20-acre lease area. Although the proposed facility footprint is approximately 3 acres or less, the majority of the leased area was surveyed to allow for maximum facility options (e.g., placement of fencing, plant restoration, building sites, generators, etc.). A small portion of the lease was not surveyed due to steep terrain and heavily vegetated ground cover. Survey coverage is shown in Figure 3. No construction or other ground-disturbing activities are planned for the area not surveyed. Approximately 25 acres were intensively surveyed. Only modern artifacts or features were noted; no historic or cultural properties were found.

TEAMS archaeologists Nykamp and Pope transected the area using survey intervals of 10 meters or less. For the most part, transects were parallel and followed the contours of the slope in an east/west general direction. Efforts were made to maintain 10-meter spacing even in densely vegetated areas. All global positioning system (GPS) data was taken using an Archer hand-held GPS unit with a Trimble receiver, set to NAD 83, Zone 5. Data collected includes transects, roads, and modern features as identified.



Drawn By: R. H. Nykamp, USDA Forest Service TEAMS Enterprise Team

Date: February 13, 2009

Figure 3: Facility Survey Coverage

Item	UTM Location (NAD 83, Zone 5)
Cabled Log	262211mE, 2208724mN
Shovel Head	262295mE, 2208693mN
Auto Body	262263mE, 2208774mN
Mineral Lick	262123mE, 2208911mN
SW Lease Corner	261937mE, 2208763mN
NW Lease Corner	262061mE, 2208941mN
NE Lease Corner	262368mE, 2208767mN
SE Lease Corner	262227mE, 2208564mN

Table 1: Noted features within the facility survey area



DSCN0884

Typical facility survey transect; E. Pope in clearing, photo center.

1. Braided metal cable attached to a downed tree during pasture maintenance.

(Right) E. Pope taking data points; note scale on downed tree next to cable (left).



DSCN0905



DSCN0907

2. Shovel head and braided cable, found adjacent to a tree south of the stock pond.



DSCN0901

(Left) Note the absence of a shovel handle; the scale is next to a cable segment. (Right) E. Pope is standing next to shovel head and cable. Note the stock pond in foreground.



DSCN0902

3. 1963 Ford Galaxie car body (Nolan 2009, *personal communication*)



DSCN0885



DSCN0886



DSCN0887



DSCN0891

(Top left) The car body is located top left in photo 0885. Note the ATV trail as noted in Figure 3. This trail leads from the existing access road and proceeds east, where it extends beyond the 20-acre leased parcel, outside the area of analysis. Due to concerns from potential hazardous waste associated with the relic, it is proposed that the car body be removed. (Top right) Note the rusted condition of the 1963 Ford Galaxie car body. This view is north from the ATV trail. The license tag indicates abandonment of the vehicle post 1969. (Center left) Note the "Galaxie" emblem and blue paint. This, and photo center right allowed for the identification of the car as a 1963 Ford model (Nolan, *personal communication*, <http://www.dearbornclassics.com/galaxie.html>). Remnants of the blue-colored steering wheel and vinyl upholstery fragments were also noted. Note the grill and headlight configuration. 1969 Hawaii license tag reads 4Z-714 (bottom right).



DSCN0890

4. Mineral-lick and shed: small wood structure with corrugated roof containing a metal enamel tub with mineral blocks for cattle supplement.



DSCN0877



DSCN0878

(Left) This view is north; the shed and mineral lick are to left of the access road (2-track), which is known as Blair Road as it proceeds south beyond the 20-acre lease area. E. Pope is standing at the point the ATV trail shown in photo DSCN 0885 proceeds east to the stock pond and beyond the 20-acre lease. Close-up of shed and tub containing mineral supplement blocks. The view is north; the access road is to the photo right. (Right) Close-up of shed and tub containing mineral supplement blocks. The view is north; the access road is to the photo right.

5. Stock pond: approximately .06 acre in size, and apparently constructed with a bulldozer. The downhill side has a slight dirt berm, and a trench proceeds eastward to a ravine located on the eastern edge of the 20-acre lease.



DSCN0896



DSCN0897

(Left) The view is east. Note the trench on the east side of stock pond, leading to a stream tributary, and the berm piles on the north (downhill) side of the pond. These appear to be bulldozer cuts and piles. The ATV trail shown in Figure 4 leads to the pond and proceeds east into the forest, beyond the 20-acre lease. (Right) This view is east-southeast, noting the profile of the berm below the pond.

The following photos indicate the general nature of the survey area.



DSCN0895



DSCN0028

DSCN0895 shows the type and density of the pasture grass that was planted to replace the native vegetation. DSCN0028 is a view south east from the SE corner of the 20-acre lease (R. Nykamp in photo), showing the more natural vegetative cover.



DSCN0916



DSCN0921

DSCN0916 is a view west, E. Pope standing at the SE corner of the 20-acres lease. DSCN0921 is a photo from the SW area of the 20-acre lease, looking north, and is an example of the modified terrain for pasture use. Note that the larger trees within the pasture area have been individually mapped by the HETF and are to be left standing.

The second phase of this report looked at the proposed utility corridor. The corridor is approximately 2.8 miles in length and both sides of road were surveyed for a distance up to approximately 15 feet, terrain and vegetation cover permitting.

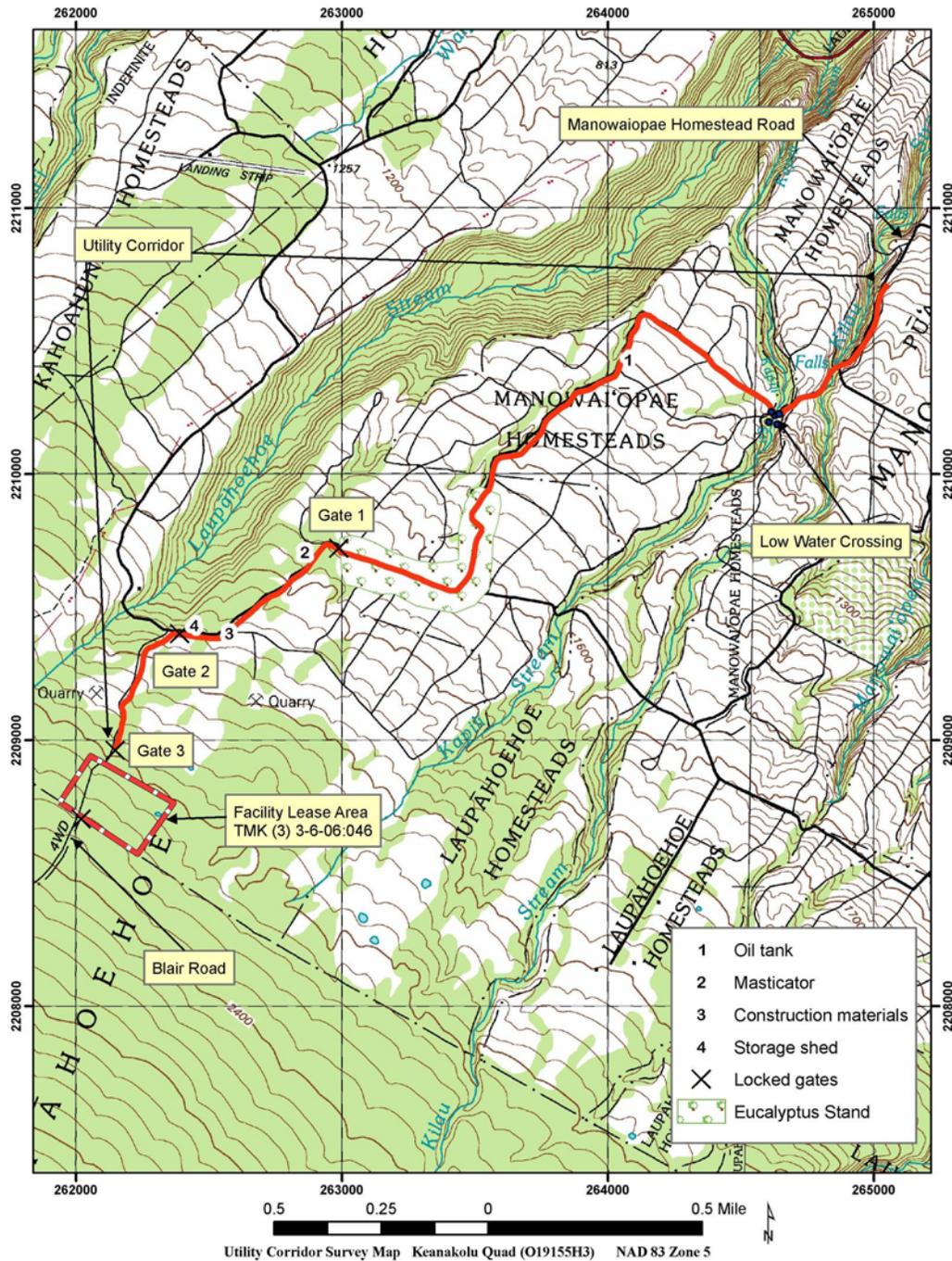


Figure 4: Utility Corridor Survey

Approximately 5 acres within the utility corridor were investigated. The entire corridor is heavily disturbed. As previously stated, the corridor follows the existing Manowaiopae Homestead Road leading into the 20-acre lease. The road is paved in the lower section

and becomes progressively rougher as it proceeds south, but has been, and is, a maintained road. By the time the road reaches the 20-acre lease, it consists of native surface and graveled material. The road prism has been ditched in spots. Water crossings have been modified by the use of cement and/or tar pour-offs. The corridor is fenced for most of the distance.

Other disturbances include historic sugar cane plantations, construction material storage, and the planting of a eucalyptus grove. Cattle grazing and horse pastures were noted. Residential and other roads lead off of the corridor. Because of these previous disturbances and the lack of cultural or historic features or sites, the utility line installation should not be considered an undertaking for Section 106 of the NHPA. The conditions and rationale are documented below.

Three road/utility line segments (1-3) are described. The first segment is approximately 1.97 miles long. It starts on Manowaiopae Homestead Road approximately 0.96 mile south of Highway 19. This is where the current utility line ends.

Segment 1 ends at Gate 1. The area was historically used for sugar-cane cultivation, and today is primarily used for residential sites and for pastures. No evidence of the sugar-cane era, other than disturbed landscaping and vegetation changes, were noted. The entire segment is paved. Within this segment is the low water crossing (discussed later in this report), and a grove of eucalyptus trees (Figure 4). One “feature” was noted in this segment, an oil tank (Item 1, Figure 4). The tank is a large fuel or oil tank, mounted on a trailer, located in front of a private residence (see photo below). It is outside the prism of the proposed utility line and is less than 50 years old.



DSCN0957

The following environmental photographs depict the overall condition and level of disturbances found within Segment 1.



DSCN0962



DSCN0959

DSCN0962 is a close-up of a concrete and corrugated metal culvert located on the uphill side of the road; DSCN0959 is an overview of the culvert, and associated ditch work and loose cobble facing on the hill side. Note also the grooved pavement from road maintenance activities.



DSCN0033



DSCN0969

DSCN0033 and 0969 are general overviews, looking NNE towards the low-water crossing (0969 is the Kapili Stream, photo right, where it crosses the road to the photo left). Note the paved condition of the road, the fencing, and the changes in vegetation. Residential units are located in the upper photo left of both photos.



DSCN0965



DSCN0964

Located approximately midway into Segment 1, these photos (view north) show road cuts, ditching, pasture improvements, guard rails and fencing impacts.



DSCN0947



DSCN0031

These photos are of the eucalyptus grove at the south end of the segment. Note the plantation arrangement and corridor roads leading off of the main road in 0947, view NNE. DSCN0031 is a view to the south, and Gate 1 is in the background next to the parked vehicle. Note the vegetation types and treatment (mowed), and the condition of the paved road.

Segment 2 is between Gates 1 and 2 and is predominately paved, with some deteriorated spots. A pile of construction materials (lumber, corrugated metal, pipe, etc.) was noted between Gates 1 and 2, as well as an abandoned masticator. A storage-shed and modern trash is located just north of Gate 2. Segment 2 is approximately 0.47 mile in length.



DSCN0943



DSCN0940

DSCN0943 is a view from Segment 2 looking 115° towards Gate 1 (note the eucalyptus grove north of Gate 1 in Segment 1). Note the continued deterioration of the paving, and the ditching in photo right. DSCN0940 is a masticator (Item 2, Figure 4) used to break up the vegetation and prepare the soil for modification. This machine would be pulled by a tractor, bull-dozer or other tracked-tread type of equipment. Although of historic vintage (based upon appearance) this item is located on private land and outside the proposed utility corridor and was not recorded.



DSCN0937



DSCN0936

Located approximately midway into Segment 2, DSCN0937 is a view 160° showing a modified stream crossing. The paving extends from the road into the drainage to prevent continual erosional problems. DSCN0936 is to the right of the drainage in 0937 showing the use of the area for cattle grazing. Evidence of cattle grazing was noted along the entire stretch of Segment 2.



DSCN0934



DSCN0935

These photos depict impacts from ranching maintenance activities and storage of piled materials on the road side (Item 3, Figure 4). DSCN0934 (view 60°) is an overview. Materials include logs, pipe, fencing material and debris. E. Pope is standing next to the pickup taking a GPS point. Note the road condition – the paved portion contains scars from a dozer track, the overall paving is declining, and the area to the right of the road has been ditched. It appears that an earlier road route, now overgrown, is located in the photo center, to the left of the pickup. DSCN0935 is a close up of the material and shows fencing and a ranch access road (view 100°).



DSCN0930



DSCN0929

DSCN0930 (Item 4, Figure 4) is a modern storage shed located on private land (view 30°). DSCN0929 is of Gate 2 (view 115°) from Segment 3. Note the storage shed in the back ground.

The road surface between Gates 2 and 3 steadily deteriorates, until paving is mostly absent as the corridor approaches Gate 3. Gate 3 marks the entrance to the 20-acre lease.



DSCN0927



DSCN0925

DSCN0927 is an overview (view 60°) looking towards Gate 2 (approximately 70 meters away). Note the road surface condition. The vegetation alongside the road continues to be maintained (mowed). Note the flagged lath, photo center to the right of the road. The lath marks the approximate location of the utility line. DSCN0925 (view 20°) is looking towards Gate 3 and the end of the utility corridor investigation.

Item	UTM Coordinates NAD 83, Zone 5
Corridor Start	265045mE, 2210715mN
Fuel Tanker	264080mE, 2210428mN
Eucalyptus Grove Start	263550mE, 2209940mN
Eucalyptus Grove End	262995mE, 2209710mN
Gate 1	262988mE, 2209720mN
Masticator	262860mE, 2209702mN
Construction Materials	262585mE, 2209395mN
Storage Shed	262445mE, 2209421mN
Gate 2	262391mE, 2209398mN
Corridor End and Gate 3	262147mE, 2208965mN

Table 2: Noted features along utility corridor

The low water crossing improvements at the Kapili Stream site (Figure 4) were also investigated (see photos on following page). As previously stated in Alternative 2, a 12+/- foot shift of the roadway from the center of the Kapili Stream road crossing and for the next 25 feet (traveling up the road) would improve the horizontal curve and also

move away from an existing undercut. The elevation of the road may change slightly, but will match the stream on the high side maintaining the same flow capacity.

At the proposed low water crossing improvement area, the existing crossing was documented. The approximate UTM location at the crossing is 264627mE, 2210226mN. The crossing consists of a slight dip in the paved road. The upstream side is not re-enforced or improved, and the stream leads right to and over the road (dry at the time of this survey). The downstream side drops approximately 20 feet. A 50 foot semi-circular retaining wall was built up 15.5 feet on the Makai side of road, using cement, pebbles and cobbles. Portions of this wall have been undercut by erosion.

No documentation of the time of construction of the reinforcement at the water crossing was found, but in consultation with the SHPD (Donham 2008, *personal communication*) the retaining wall was likely constructed when the Blair Road was built to support the crossing for use of logging trucks (Maly and Maly 2006).



Photos courtesy of the HETF

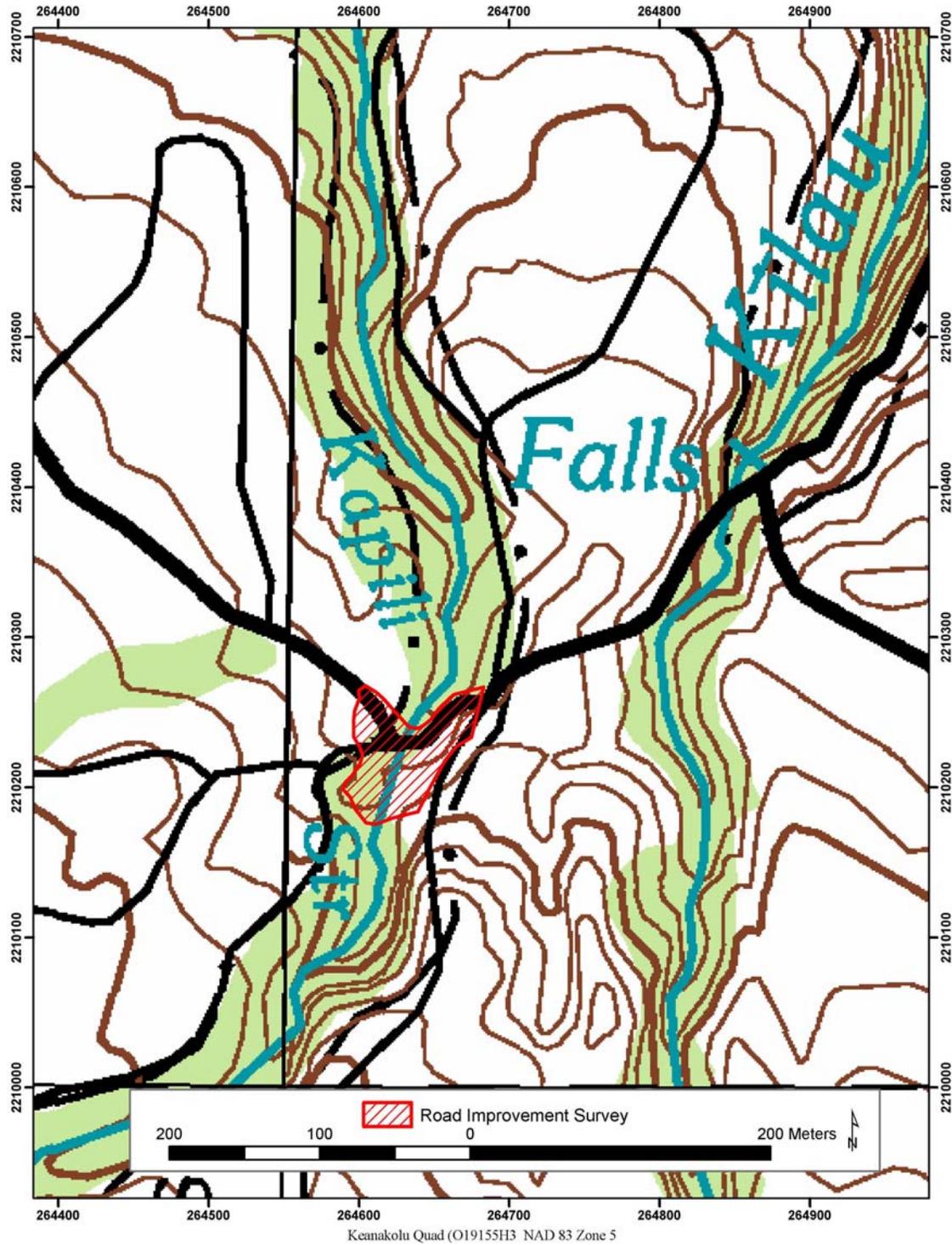


Figure 5: Low Water Crossing and Road Improvement Survey

Approximately one acre was surveyed. The proposed shift in the road alignment is within the utility corridor previously discussed. A survey buffer was applied to the area to ensure no cultural or historic resources were present. None was found.



DSCN0974



DSCN0993



DSCN0039

DSCN0974 (view 230°) shows E. Pope approaching Manowaiopae Homestead Road, from the upstream side of Kapili Stream. Note the deterioration of the road paving. DSCN0993 is the north face of Kapili Stream, showing the semi-circular retaining wall. The wall is undercut in several spots. Note the small stones used in the wall on the photo left, and the amount of moss covering the stones. Larger stones were used in the central and western (photo right) portions. DSCN0039 shows that the depth of the retaining wall is one layer thick. Note the non-uniform and unmodified stone, held in place by cement. The bottom of the photo shows the undercutting occurring at the bottom of the wall, and the upper portion shows the erosion and deterioration of the central portion of the wall.

Discussion

The Hawaii Experimental Tropical Forest project area at Laupāhoehoe is situated at approximately 3,500 foot elevation in an Ohia forest area. It receives 90 to 150 inches of rainfall annually and is in the Kilau, Kapili, and Laupāhoehoe Stream Watersheds. The slope ranges from 6 to 20 percent. The soil is classified as Kiloa Extremely Stoney Muck.

The 20-acre project area has been modified by previous ranching activity. Areas of forest have been cleared and grasses have been planted. A water collection pond has been constructed and a few two-track roads exist on the property.

As stated by Maly and Maly (2006, page 29), the upland forest region was used occasionally as travel routes, and other uses of an historic or cultural nature was minimal. The utility corridor, including the low water crossing area, has been heavily disturbed in historic and recent times. No historic or cultural resources were noted as a result of this inventory.

Determination of Effects

For all alternatives, no direct, indirect, or cumulative impacts to historic or cultural properties would occur from any of the proposed actions due to the fact that no historical properties were identified. Incorporation of the design criteria would reduce impacts from project activities in the case inadvertent discoveries were made during project activities.

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Nolan, P.R. 2009. Personal communication, January 28: identification of car body from web site <http://www.dearbornclassics.com/galaxie.html>.



Subject: Environmental Justice Documentation for the Laupahoehoe Education and Research Center Facility Construction Project.

To: The project record

Introduction

The construction of a research and education center as proposed in the Environmental Assessment must be in compliance with Executive Order (EO) 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. The EO calls for consideration of the environmental, health, and economic effects on minority and low-income areas including the consumption patterns for fish and wildlife. The EO states that when low-income or minority populations of the affected area, or county, are greater than twice the state percentage for low-income or minority populations, an environmental justice assessment must be conducted.

According to the US Census (2000) the population in the county of Hawaii (the island of Hawaii) is 26% minority with 13.3% individuals living below the poverty level. The population of the entire state of Hawaii (all islands) is 73.5% minority with 13.3% individuals living below the poverty level.

Conditions in Hawaii County which is associated with the Laupahoehoe Education and Research Center Facility Construction Project do not meet the minority population requirement for an environmental justice assessment and therefore the Executive Order does not apply to this project.

Sincerely,

/s/ Julie Laufmann

Botanist/Ecologist

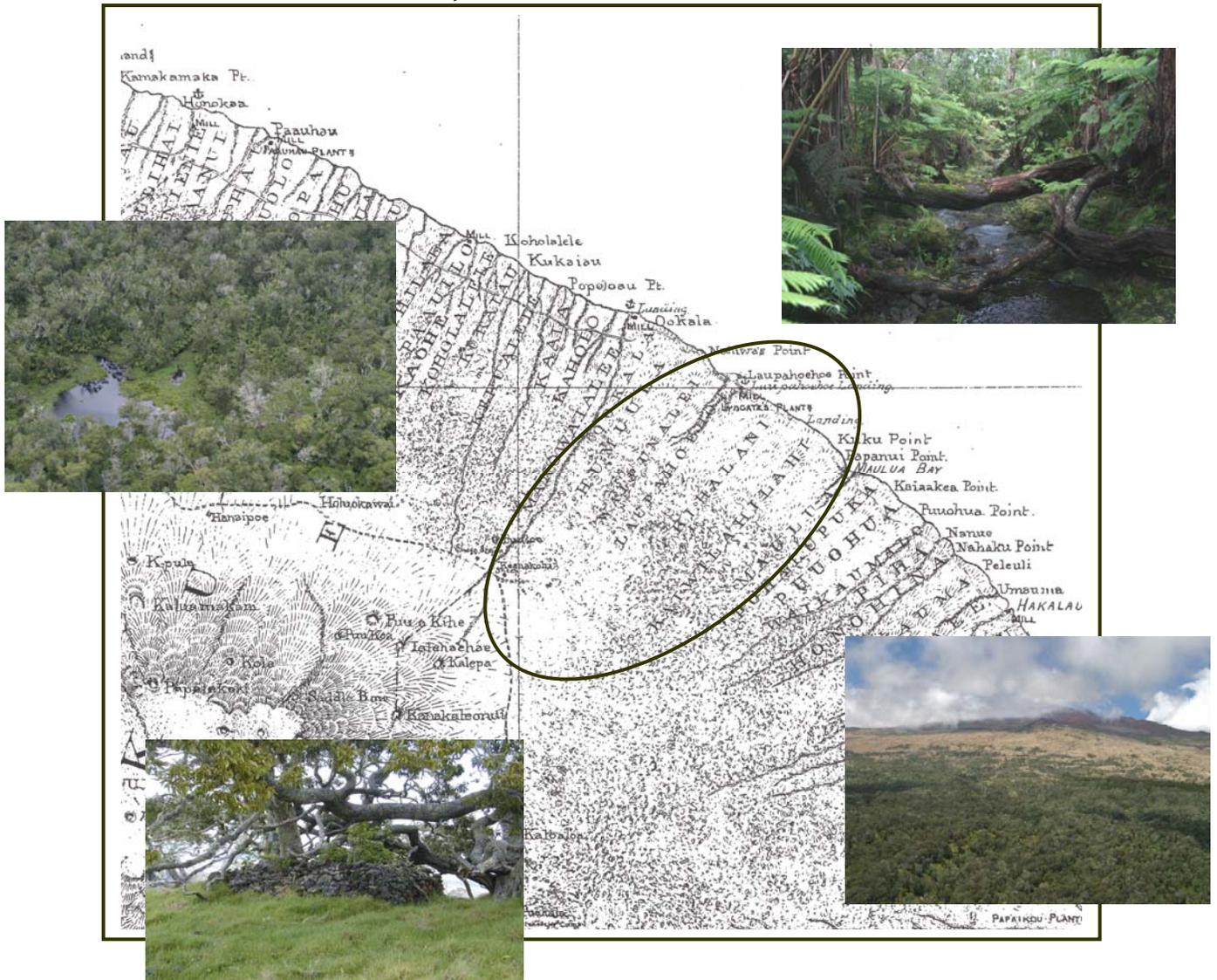
USDA Forest Service - National Headquarters

Enterprise Program - TEAMS Enterprise

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Fort Collins, CO 80526

HILO PALIKŪ— HILO OF THE UPRIGHT CLIFFS: A Study of Cultural-Historical Resources of Lands in the Laupāhoehoe Forest Section, Ahupua‘a of the Waipunalei-Mauluanui Region, North Hilo District, Island of Hawai‘i



Lands and Resources of the Laupāhoehoe Forest Region and Vicinity
(Register Map No. 1438—Kingdom of Hawai‘i, Survey Dept. 1886; photos courtesy of the
Institute of Pacific Islands Forestry; and from collection of Kumu Pono Associates LLC)

Kumu Pono Associates LLC



Historical & Archival Documentary Research · Oral History Interview Studies · Researching and Preparing
Studies from Hawaiian Language Documents · Māhele ‘Āina, Boundary Commission,
& Land History Records · Integrated Cultural Resources Management Planning ·
Preservation & Interpretive Program Development

**HILO PALIKŪ–
HILO OF THE UPRIGHT CLIFFS:**

***A Study of Cultural-Historical Resources of
Lands in the Laupāhoehoe Forest Section,
Ahupua‘a of the Waipunalei-Mauluanui Region,
North Hilo District, Island of Hawai‘i
(TMK Overview Sheet 3-7-01)***

By

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&
Onaona Maly • Researcher*

Prepared for

*United States Department of Agriculture
Forest Service – Institute of Pacific Islands Forestry
60 Nowelo Street
Hilo, Hawaii 96720*

December 5, 2006

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*Historical & Archival Documentary Research · Oral History Interview Studies ·
Researching and Preparing Studies from Hawaiian Language Documents ·
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Resources Management Planning · Preservation & Interpretive Program Development*

EXECUTIVE SUMMARY AND ACKNOWLEDGEMENTS

This study of cultural and historical resources of the Laupāhoehoe region on the island of Hawai'i, was conducted at the request of the United States Department of Agriculture—Institute of Pacific Islands Forestry (Institute). The Institute proposes to have an approximately 4,800 acre section of what is now called the Laupāhoehoe forest, along the north eastern slope of Mauna Kea, on the Hilo coast, designated as one of two locations that would be a part of the Hawai'i Experimental Tropical Forest (HETF) program. The Laupāhoehoe section is actually part of the older Hilo Forest Reserve, originally set aside for conservation in 1905. The lands that make up the Laupāhoehoe section of the forest are comprised of at least fourteen (14) traditional land divisions or *ahupua'a*—all of which extend from the ocean to varying elevations on the mountain slopes, terminating in the forests, where they are cut off by adjoining lands.

The lands of the proposed Laupāhoehoe HETF are part of an ancient region, traditionally known to the Hawaiians as the *wao akua* (region of the gods), *wao ma'ukele* (wet forest zone) and *wao nahele* (forest zone). In traditional times—pre-western contact in 1778, and in subsequent years through the early 1800s—these forested regions, particularly the *wao akua*, were considered sacred, the abode of the gods. Travel through the forest lands, undertaking collection of resources—gathering woods and other plant materials, collection of feathers and catching birds, and even travel through the forests, simply to reach another destination beyond the forest—was undertaken with prayer, caution, and respect. Damage to the living forests was often punished by acts of nature—heavy rains might wash the careless traveler from the path; dense mists or sudden growth of such plants as *uluhe* or *'ōpiko*, might cause the trail to be lost from view, and the traveler to wander aimlessly through the forests.

In this collection of native and historical accounts we also find that the lands of the Laupāhoehoe forest region are frequently mentioned in several prominent traditions. Significantly, the importance of the Laupāhoehoe region *koa* forests, mountain bird habitats, and the traditional trails which connected the lowlands with the mountain lands and neighboring districts, are frequently referenced in traditions and historical accounts. Also, battles fought on the Laupāhoehoe lands were among those which established the kingdoms of chiefs between the early 1500s to the late 1700s. While many of the accounts cited in the study relate to the lower lands of the Laupāhoehoe vicinity—those lands situated below the 2,000 foot elevation—there are occasional references to travel through the upland forests to the mountain region. There are also specific references to the traditional significance of Laupāhoehoe, and the occurrence of numerous *heiau* (ceremonial sites) of local and regional significance, though the record is seemingly silent on the location of *heiau* that might have occurred in the forest region.

The combined documentation does provide us insight into the kinds of uses and features which might be expected to occur in the forest region. These include, but are not limited to—trails extending from the shore to the mountain lands; shelters and resting places along trail sides; shrines used by travelers, bird catchers, canoe makers and other practitioners; battle sites and hiding places; and possible burial sites. Traditional features would include several forms, ranging from stone platforms, terraces, cairns, and walls; and shelter features—called *pāpa'i* by the ancient Hawaiians—generally made of wood, leafy branches and ferns. Many of the features would naturally deteriorate and evidence of them would return to the earth. Other features of stone, might still be visible in the understory, though only found upon careful search. Another feature of importance would be stone filled fractures or crevices, and caves. Such features were sometimes used for shelters over generations, or as burial sites, and as places in which to hide valued cultural artifacts.

One Hawaiian elder with whom we have spoken, told a story of hunting the forest lands above Pāpa'aloa, as a teenager (ca. 1940s), and of being shown a cave in which artifacts had been hidden generations before. His uncle showed him the location, but it is to remain secret and undisturbed.

Reportedly, the cave was even “booby-trapped,” to prevent theft (pers. comm., Edward Woolsey, June 16, 2006).

Among the earliest historical accounts of travel through the lands of the Laupāhoehoe forest region, are those dating from 1823. At that time, a party of missionaries were led from Hilo Bay to Laupāhoehoe on the coast, and then through the forest, to skirt the Hilo-Hāmākua region while traveling to Waimea. Subsequently, in 1825, and in later years, Laupāhoehoe served as the departure point for several exploring parties bound for the summit of Mauna Kea. In 1825, James Macrae undertook a study of the botany and geology of the Laupāhoehoe forests and Mauna Kea region. Several later visitors and residents also described the region, and the Laupāhoehoe-Waipunalei Trail remained one of regular use by travelers through the 1870s, with Kingdom funds used at times for “road” maintenance.

The lowlands of the Laupāhoehoe region, covering fourteen *ahupua‘a*, became the focus of sugar plantation efforts as early as the 1850s. But it was not until 1876, that a full-scale plantation was incorporated, and a mill established. The Laupāhoehoe Sugar Company and Mill, secured fee-simple and lease-hold interest in lands of the Laupāhoehoe vicinity. As the plantation developed, lowland forests, up to about the 2,000 foot elevation were cleared for cultivation of sugar, and development of flumes and water resources. As a part of the plantation development, and the efforts of the government to encourage settlement in the Laupāhoehoe vicinity lands, homestead lots were also developed, and the lower boundaries of the forest reserve lands mark the edge of the homestead lots. It was these homesteading families, along with the older Hawaiian families who resided in the area, that frequented the higher forests for pig hunting activities through the 1900s.

During the early historic period, the upland section of the Laupāhoehoe forests were impacted by herds of wild sheep and bullocks. By 1825, foreign bullock hunters had established camps on the outer edges of the forest, in the region where Laupāhoehoe and neighboring lands are cut off by the *ahupua‘a* of Humu‘ula. By the 1850s, the bullock and sheep hunting activities were giving way to formal ranching operations, with the land of Humu‘ula taking in sections of the Laupāhoehoe forests. By the 1880s, the original sheep ranch station at Keanakolu (in the original place of that name, near the Laupāhoehoe-Humu‘ula boundary), was built, and historic photos from 1885 depict ranch buildings made of *koa* logs. There remain on the land in the present-day, the ruins of stone shelters, pens, and foundations on the upper Laupāhoehoe-Humu‘ula region. Noted places such as Keanakolu (not the same location of the present-day cabin of that name), Lahohinu, and Keahua-ai (Douglas Pit), are considered significant features of the historical landscape.

The same feelings of significance for the *‘āina* and forest regions of the Laupāhoehoe vicinity, as those expressed in native traditions are still held today, by Hawaiians of Laupāhoehoe. Care for the land, forest resources, and cultural sites remain important in the present day. A family organization made up of Hawaiians whose ancestors lived in Laupāhoehoe and neighboring *ahupua‘a* more than 200 years ago, are actively documenting family traditions and developing stewardship programs for their ancestral lands. The organization called, “*Nā Waiwai o Laupāhoehoe*,” involves *kūpuna* (elders) and members of the younger generations in these efforts.

The voices of our elders are among the most precious resources handed down to us from our past. While the historical and archival records help us understand how we came to be where we are today, the voices of the elders give life to the history, and demonstrate how practice and history are handed down and continued. To each of the *kama‘āina* who shared their recollections and history in this study, we extend our sincerest appreciation and *aloha*—

(in alphabetical order)

The late, John Ah San; the late Rally Greenwell, and Patricia Gilman Greenwell; Albert Kahiwaokalani Haa, Sr., and son; the late, Toshi Imoto; Sonny Kaniho, and the late, Daniel Kaniho; Pi‘i Laeha (of *Nā Waiwai o Laupāhoehoe*); Pete L’Orange; and Elizabeth “Tita” Ruddle Spielman and JK Spielman.

Also to — Michael Constantinides; Lisa Hadway; Moana Rowland; Paul Scowcroft; and staff of the Institute of Pacific Islands Forestry — *Mahalo a nui!*

Māua no me ke aloha kau palena 'ole — Kepā a me Onaona Maly.

***Wahi mai nā kūpuna, “A‘ohe hana nui ke alu ‘ia!”
(It is no great task when done together by all!)***

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INTRODUCTION

Background

The following collection of archival and oral historical-consultation records pertaining to lands of the Northern Hilo region—historically several lands making up the Laupāhoehoe Forest Reserve (*Figure 1*)—on the Island of Hawai'i, was compiled by *Kumu Pono Associates LLC*, at the request of the USDA Institute of Pacific Islands Forestry. The study was prepared in conjunction with a proposal to designate a section of the windward Hawai'i watershed, as a Hawai'i Experimental Tropical Forest (HETF) site. The HETF program is a federal initiative of the United States Department of Agriculture. The HETF designation would establish a portion of the existing Laupāhoehoe Forest Reserve as a research forest, a demonstration forest, and a teaching forest. It is envisioned as a place where individuals of varying research and conservation backgrounds could work towards better understanding the unique nature of Hawaiian ecosystems; develop programs for long-term protection of Hawai'i's wet-forests; and improve our understanding of the dynamic nature of such a forest region in both its natural and cultural settings (see Governor Linda Lingle; to U.S. Secretary of Agriculture, Michael Johanns, March 1, 2006).

This study seeks to provide state and federal resource managers, and members of the community at large with access to documentation pertaining to the cultural and historical significance of the lands considered as a part of the Hawai'i Experimental Tropical Forest program. It is hoped that such information will help all interested parties appreciate and value the traditions, customs and practices of the Hawaiian people, recognizing that their culture is an integral part of any program that might be considered in management of the forest resources.

Archival-Historical Documentary Research and Oral History Interviews

The research conducted as a part of this study, was performed in a manner consistent with Federal and State laws and guidelines for such studies. Among the pertinent laws and guidelines are the National Historic Preservation Act (NHPA) of 1966, as amended in 1992 (36 CFR Part 800); the Advisory Council on Historic Preservation's "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (ACHP 1985); National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1990); the Hawai'i State Historic Preservation Statue (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of on-going cultural significance; the criteria, standards, and guidelines currently utilized by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) for the evaluation and documentation of cultural sites (cf. Title 13, Sub-Title 13:275-8; 276:5 – 2003); and the November 1997 guidelines for cultural impact assessment studies, adopted by the Office of Environmental Quality Control (which also facilitate the standardized approach to compliance with Act 50 amending HRS Chapter 343; April 26, 2000).

As a part of research conducted over the last ten years on the mountain lands of the Hilo and Hāmākua region, the authors have investigated a wide range of archival-historical literature, referencing both native Hawaiian language and English texts; and conducted field visits and interviews with elder *kama'āina* (native and long-time residents) known to be knowledgeable about the history, residency and land use on the *'āina mauna* (mountain lands), of which the proposed Laupāhoehoe HETF are a part. The narratives cited in this study provide readers with access to a rich and diverse collection of cultural-historical accounts for these lands, situated on the *ko'olau* (windward) side of the island of Hawai'i.

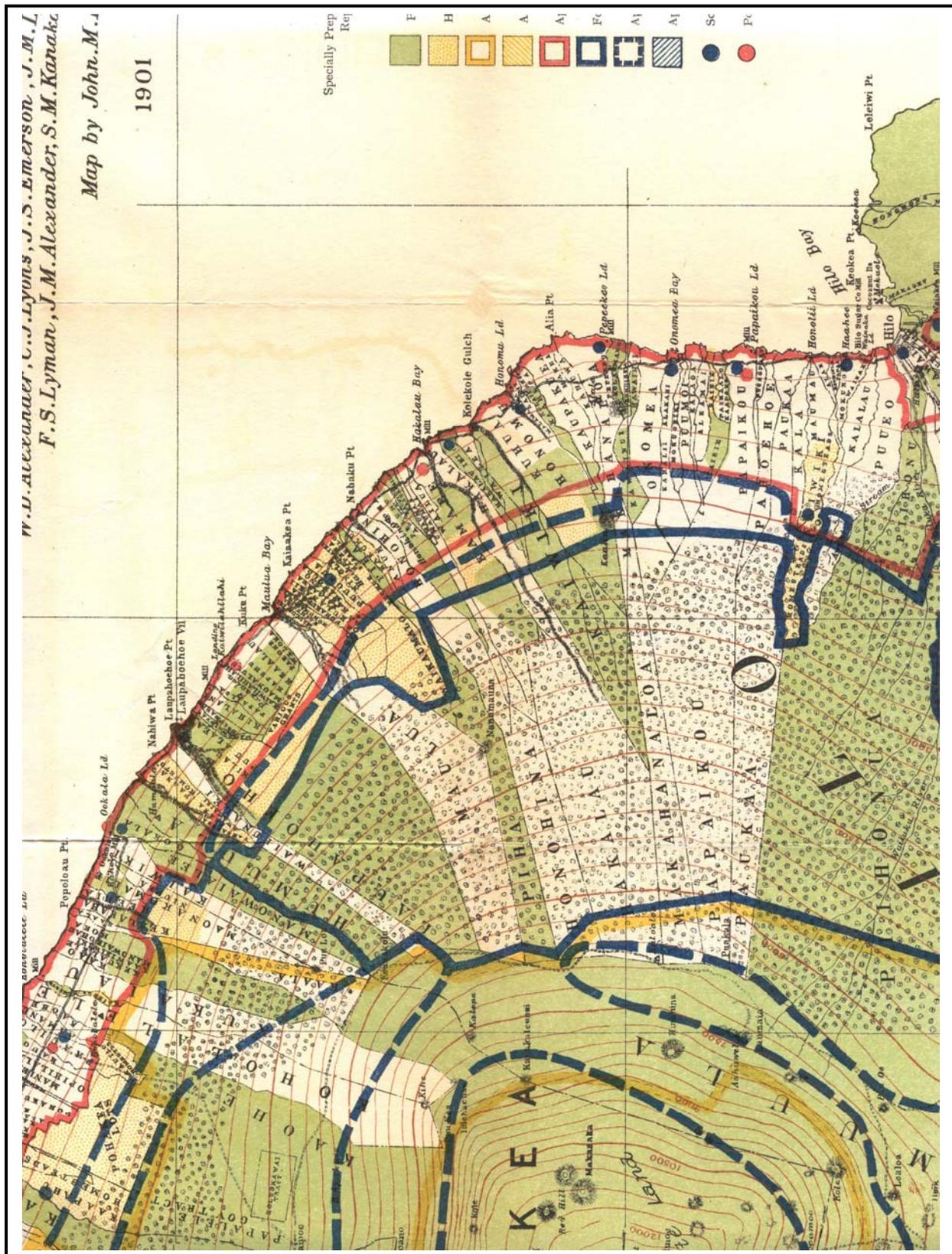


Figure 1. Lands of the Hilo Forest Reserve – Laupāhoehoe and Vicinity, Depicting Government Forest Lands, Private Lands and Ahupua‘a Boundaries. Detail from Hawaii Territorial Survey Map, 1901 (W.D. Alexander and W.E. Wall)

While conducting the research, primary references included, but were not limited to—land use records, including the Hawaiian Land Commission Awards (L.C.A.) records from the *Māhele ‘Āina* (Land Division) of 1848; the Boundary Commission Testimonies and Survey records of the Kingdom and Territory of Hawai‘i; and historical texts authored or compiled by—D. Malo (1951); J.P. I‘i (1959); S. M. Kamakau (1961, 1964, 1976, and 1991); His Majesty, King David Kalākaua (1888); Wm. Ellis (1963); records of the American Board of Commissioners of Foreign Missions (A.B.C.F.M.) (1820-1860); Chas. Wilkes (1845); G. Bowser (1880); and records of the Territorial Board of Forestry. The study also includes excerpts of several native accounts from Hawaiian language newspapers (compiled and translated from Hawaiian to English, by Maly), and historical narratives authored by eighteenth and nineteenth century visitors, and residents of the region.

Archival-historical resources were located in the collections of the Hawai‘i State Archives, Survey Division, Land Management Division, and Bureau of Conveyances; the Bishop Museum Library and Archives; the Hawaiian Historical Society and the Hawaiian Mission Children’s Society Library; University of Hawai‘i-Hilo Mo‘okini Library; the Houghton Library at Harvard; the *Paniolo Preservation Society* (PPS) and Parker Ranch collections; private family collections; and in the collection of *Kumu Pono Associates LLC*. This information is generally cited in categories by chronological order of the period depicted in the narratives.

Lands of the Laupāhoehoe Forest Region

The proposed Laupāhoehoe HETF study area is situated in the upper lands of what is now generally called the *ahupua‘a*¹ of Laupāhoehoe—the land area ranging from approximately the 4,000 to 6,000 foot elevation. Because this forest zone is a part of a larger land area, it is necessary to look at its’ history in the cultural-historical context of the *ahupua‘a* of Laupāhoehoe and lands that adjoin it, all of which are situated in the larger traditional district of *Hilo Palikū* (Hilo of the upright cliffs). As known today, Laupāhoehoe rises above and cuts off a number of smaller *ahupua‘a* in the region. And the history of Laupāhoehoe is tied to the history of its’ neighboring lands. Over the generations, residents from a number of land areas, accessed the Laupāhoehoe forest region (which makes up the proposed Laupāhoehoe HETF) for religious purposes, to acquire prized natural resources, and for cultural practices.

The forest lands of this region represent significant native (endemic and indigenous) resources, and are part of a unique cultural landscape—in that the native flora, fauna, mist, rains, water, natural phenomena and resources, are all believed to be *kino lau* (the myriad body-forms) of gods, goddesses, and lesser nature spirits of Hawaiian antiquity. Knowledge of the environment and respect for the resources, ensured a sustainable life upon the land. And in their evolving relationship with natural resources such as those of this region, Hawaiians came to consider everything about them as godly manifestations. Care for, and respect of the earth, meant that in-turn, the earth would care for the *kānaka* (people).

The Hilo Forest Reserve which includes the Laupāhoehoe-Welokā forest section, was established in 1905, as a part of the newly formed forestry programs of the Territory of Hawai‘i. The area of interest to this study is part of a network of conservation areas, making up the entire forest belt of the Hilo District (the Hilo Forest Reserve), and adjoins the Mauna Kea and Hāmākua region Forest Reserves. The area of the proposed Laupāhoehoe HETF also adjoins the Laupāhoehoe Natural Area Reserve, which was established in 1983. The primary focus of the Forest Reserve programs, established in the early 1900s, was to protect the water-producing forests of the Hilo-Hāmākua Districts, in order to ensure adequate water supply for the growing interests of sugar plantations and homesteading

¹ *Ahupua‘a* – a traditional land division that extends from an area in the sea, fronting the land, to an area on the mountain. Such land divisions included all the primary environmental zones of the Hawaiian Islands, and when managed in the traditional system of religious, political and social protocols, ensured that residents had access to all the natural resources necessary to sustain life upon the land.

(settlement) programs on government lands. In the early forestry programs, the forests were also viewed for economic values—what could be harvested from them, primarily in the form of native woods (e.g., *koa* and *‘ōhi‘a*), and in cash-tree crops.

Evidence of the earlier impacts of economic “valuation” of Hawaiian forest resources is found on the lands of the existing forest reserve and the proposed Laupāhoehoe HETF. The feature, today known as “Blair Road,” which extends from the Laupāhoehoe Homestead Lots (formed between 1904 to 1914), below the 2,000 foot elevation, to above the 5,000 foot elevation. The road was used by a Hawaiian wood-craft manufacturer, Blair Woods Hawaii, in the 1970s, to access and harvest *koa* and *‘ōhi‘a* for manufacture of “Hawaiian” lumber, utensils, dishes, platters and art work.

Over the last 100 years, forestry programs in Hawai‘i have evolved. There has been an increasing awareness of the unique ecological and biological values of Hawaiian forest lands. Today, the forest system is valued for its biological diversity—as ecosystems that are home of unique and fragile Hawaiian species, rather than just how much can be gotten from it in an economic sense.

As noted above, the Laupāhoehoe section of the proposed HETF includes a portion of the *ahupua‘a* of Laupāhoehoe. Based on traditional accounts, it also includes a portion of several smaller *ahupua‘a*, including, but not limited to: Kihalani, Pāpa‘aloe, Kaiwilahilahi, Kapehu and Welokā (Welokā is a narrow land forming the southern boundary of the HETF). We find that there is quite a bit of confusion in the historical record, pertaining to the boundaries of the lands that make up the Laupāhoehoe Forest Reserve. This is in part explained by an 1870s account which states that Kamehameha I changed the boundaries of the lands following battles in which he was victorious (ca. 1780s) in the Laupāhoehoe region (see Boundary Commission proceedings in this study). The boundary configuration of Laupāhoehoe as known today, has the land cutting off most of the smaller *ahupua‘a* from the upper forest region. Those lands, situated on the *makai* (shoreward) side of the forest lands, are generally represented as extending from a little above that 2,000 foot elevation to sea level. Thus, the land area of the proposed Laupāhoehoe HETF is generally described as comprising only Laupāhoehoe (on the north), and Welokā (on the south), but, there are twelve additional *ahupua‘a* in between, though not extending into the higher forest region.

In traditional Hawaiian times, all of these *ahupua‘a* benefited from the forest and water resources of the upper lands. Based on the ancient system of land management—as described in traditions and historical testimonies of the 1800s—we know that traditional and historic residents of the area, traveled through, and knew the lands of what is now known as the upper Laupāhoehoe forest region. As a result, it is necessary for us, in this study to discuss the various lands which make up and adjoin the area of the proposed HETF. North to south, the *ahupua‘a* which make up the study area are:

- Laupāhoehoe itself which extends from the sea to the uplands, near the 6,000 foot elevation;
- Ha‘akoa Kilau, Pu‘u ‘Ālaea, Manowai‘ōpae, Hokumāhoe, Kihalani, Pāpa‘aloe, Kaiwilahilahi, Moanalulu, Kapehu, Ke‘a‘alau, and Pae‘ohi, all of which are now considered to be cut off in the upland sections by the larger land of Laupāhoehoe; and
- Welokā, which extended some distance inland (forming a portion of the southern boundary of the forest lands).

In addition to the primary *ahupua‘a* of the study area, there are also three *ahupua‘a* which share common boundaries with the Laupāhoehoe-Welokā vicinity lands. They are:

- Waipunalei (adjoining the northern boundary, and sharing an ancient upland trail with Laupāhoehoe);
- Maulua nui, which forms the entire southern boundary of the forest zone, with Welokā, and extending to the Humu‘ula boundary; and
- Humu‘ula which cuts off, and forms the western (*mauka*) boundary of the Laupāhoehoe forest lands.

In this study, we provide readers with selected native traditions and historical accounts for all of the above named *ahupua'a*. These accounts provide us with background on land use spanning the centuries; they tell us of changes that have occurred on the landscape—particularly those following the 1840s; and they inform us of the kinds of traditional and historical features which we might expect to be found in the region of the proposed Laupāhoehoe HETF.

While we know that traditional practices of residency and agriculture focused on lands extending from the shore to around the 3,000 foot elevation, native traditions also provide us with specific descriptions of travel through the lands which make up and adjoin the proposed HETF. Practices such as trapping birds and collecting feathers, or hunting selected species of birds for food; felling *koa* for canoe making; travel to the region where the forests end, and on to the summit of Mauna Kea; the interment of remains and deification of family members on the mountain lands have been recorded. There are also a number of ancient named sites, including trails within the forest area and along its boundaries with other lands. In addition to the *ahupua'a* names, named localities include, but are not limited to:

- *Ha'akoa* (an area associated with the chief, 'Umi, and location of an important *heiau*);
- *Keahua'ai* (a hillock at the top of Laupāhoehoe – place where David Douglas died);
- *Kūlanihāko'i* (an area at the top of the Laupāhoehoe-Waipunalei boundary, where a mountain shelter once existed);
- *Kulipalapala* (an old shelter in the forest, along the Kaiwilahilahi-Kapehu-Maulua boundary);
- *Ninika* (a boggy region in the Laupāhoehoe-Maulua forest);
- *Pu'ukole* (an ancient site of a shrine for bird catchers, and shelter for those who traveled to the upper forest zone);
- *Pu'ukoa* (a *koa* covered hill on the upper boundary of Kaiwilahilahi and Kapehu); and
- *Pu'ulehu* (a shelter of canoe makers and bird catchers on the Laupāhoehoe-Maulua boundary).

Place names such as those above, document traditional knowledge of place. Native witnesses before the Commissioner of Boundaries in the 1870s to 1890s—most of whom were born between the 1780s to 1830s—described travel through the forests and across the mountain lands of the Laupāhoehoe vicinity. They demonstrated knowledge of various natural and cultural features on the land. Thus, the historical accounts inform us that it is likely that shelters, trail features, and shrines from that period, exist at various locations in the forest zone.

Caring for the Cultural Landscape of the Laupāhoehoe Forest Zone

While the primary purpose of establishing the early Hilo and Laupāhoehoe Forest Reserves was protection of the water-producing forests, the program, and subsequent development of the Laupāhoehoe Natural Area Reserve has evolved to protect the unique natural resources of the forest lands. In the Hawaiian mind, care for each aspect of nature, the *kino lau* of the elder life forms, was a way of life. This concept is still expressed by Hawaiian *kūpuna* (elders) through the present day, and passed on in many native families. Also, in this cultural context, anything which damages the native nature of the land, forests, ocean, and *kino lau* therein, damages the integrity of the whole. Thus caring for, and protecting the land and ocean resources, is a way of life. As *kūpuna* across the islands express it, “Care for the land, the land cares for you.”

In the traditional context above referenced, we find that the mountain landscape, its' native species, and the intangible components therein, are a part of a sacred Hawaiian landscape. Thus, the landscape itself is a highly valued cultural property. Its protection, and the continued exercise of traditional and customary practices in a traditional and customary manner, are mandated by native custom, and State and Federal Laws. It is important to point out that in this discussion, protection does not mean the exclusion, or extinguishing of traditional and customary practices. It simply means that such practices are done in a manner consistent with cultural subsistence, where each form of

native life is treasured and protected. *Kūpuna* express this thought in the words, “*Ho’ohana aku, a ho’ōla aku!*” (Use it, and let it live!).

Recommendations for Treatment of Cultural Resources

In regards to work which may be undertaken in the proposed Laupāhoehoe HETF, it is important that cultural resources—both tangible and intangible—be respected. For example, should fencing programs or work shelters be developed, care to ensure that cultural remains are not impacted, should be taken. It should be the goal of any undertaking to minimize the foot-print, and ensure that the landscape is left in a natural state. Fencing programs, to protect treasured natural-cultural resources from degradation by introduced animals have a long history in the region. Fencing and control of feral animals dates from the nineteenth century, and was expanded with the development of the forest reserve programs. Early fencing programs were at times destructive of the resources, today, programs designed to minimize the impacts should be employed. All participants in oral history interviews we have conducted over the last ten-plus years for lands of the Hilo forest region and Mauna Kea mountain lands have expressed the thought that care of the land, cultural resources, and forest is important.

We recommend that the HETF program managers and field crew members meet with a Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) staff person, prior to undertaking any work on fence lines or other ground altering activities. All field crew members employed on any projects in the preserve should be informed of Historic Preservation Guidelines, and made aware that if any stone features (such as walls, terraces, mounds, platforms, shelters, caves, trails or boundary *ahu*) are found, work in the area is to be stopped and modified so as to minimize impacts on such features. The management staff should also monitor all clearing as it is undertaken, to ensure proper treatment of sites, should any be discovered. Should cultural sites be encountered, it is recommended that members of the Hawaiian community at Laupāhoehoe—such as *Nā Waiwai o Laupāhoehoe*—be contacted, and consultation regarding site treatment should be undertaken along with representatives of the DLNR-SHPD.

The Hawai‘i State Historic Preservation Statute (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of ongoing cultural significance; the criteria, standards, and guidelines currently utilized by the DLNR-SHPD for the evaluation and documentation of cultural sites should be complied with. The Hawai‘i Island Representative of DLNR-SHPD should be notified of any findings, when made.

If inadvertently discovered, burial remains should be protected in place. Work in the immediate vicinity of the remains should be terminated, and the Hawai‘i Island Representative of DLNR-SHPD should be notified of any findings. Final disposition of remains will be determined in consultation with DLNR-SHPD, and Native Hawaiian descendants of the families associated with Laupāhoehoe and adjoining lands. If any burial remains should be discovered, they should be treated on a case-by-case basis in concurrence with Chapter 6E-43 (as amended by Act 306).

Finally, it is suggested here, that if funding opportunities arise, and a work-force be needed for various projects (e.g., fencing, game control, and resource monitoring, etc.), that individuals with historical ties to the Laupāhoehoe lands be involved in the programs. Research and stewardship programs will have greater long-term success when members of the local community are informed and active participants. Educational opportunities for local school programs will also help to inform communities of the values of the research being done, while researchers will also be exposed to traditional and historical values the community places on the natural and cultural landscape.

KA ‘ĀINA (THE LAND THAT SUSTAINS): A HAWAIIAN CULTURAL-HISTORICAL OVERVIEW

This section of the study provides readers with a general overview of the Hawaiian natural-cultural landscape on the island of Hawai‘i, of which the Laupāhoehoe vicinity lands are a part. The narratives include discussions on Hawaiian settlement, population expansion, and land management practices that are the basis of the sustainable relationship shared between the Hawaiian people and the land.

Hawaiian Settlement

Archaeologists and historians describe the inhabiting of these islands in the context of settlement which resulted from voyages taken across the open ocean. For many years archaeologists have proposed that early Polynesian settlement voyages between Kahiki (the ancestral homelands of the Hawaiian gods and people) and Hawai‘i were underway by A.D. 300, with long distance voyages occurring fairly regularly through at least the thirteenth century. It has been generally reported that the sources of the early Hawaiian population—the Hawaiian Kahiki—were the Marquesas and Society Islands (Emory in Tatar, 1982:16-18).

For generations following initial settlement, communities were clustered along the watered, *ko‘olau* (windward) shores of the Hawaiian Islands. Along the *ko‘olau* shores, streams flowed, rainfall was abundant, and agricultural production became established. The *ko‘olau* region also offered sheltered bays from which deep sea fisheries could be easily accessed. Also, near-shore fisheries, enriched by nutrients carried in the fresh water running from the mountain streams, could be maintained in fishponds and coastal fisheries. It was around these bays such as at Hilo, and on the sheltered peninsula of Laupāhoehoe, that clusters of houses where families lived could be found (cf. McEldowney 1979). In these early times, the residents generally engaged in subsistence practices in the forms of agriculture and fishing (Handy and Handy, 1972:287).

Over a period of several centuries, areas with the richest natural resources became populated and perhaps crowded, and by ca. 900 to 1100 A.D., the population began expanding to the *Kona* (leeward side) and more remote regions of the island (Cordy, 2000:130). Kirch (1979) reported that by ca. A.D. 1200, there were small coastal settlements at various areas along the western shore line of Hawai‘i (Kirch 1979:198). In this system of settlement and residency, the near-shore communities shared extended familial relations with those of the uplands.

By the 1400s, upland regions to around the 3,000 foot elevation were being developed into areas of residence and a system of agricultural fields. By the 1500s to 1600s, residency in the uplands was becoming permanent, and there was an increasing separation of royal class from commoners. During the latter part of this period, the population stabilized, and a system of land management was established as a political and socio-economic factor (see Kamakau, 1961; Ellis, 1963; Handy, Handy & Pukui, 1972; Tomonari-Tuggle, 1985; and Cordy, 2000).

In the region traditionally known as *Hilo Palikū*—Hilo of the upright cliffs (now known as North Hilo), the lowland region in places like Waipunalei, Laupāhoehoe and Maulua, extending from the shore to around the 3,000 foot elevation, supported residential and agricultural activities, spanning centuries of Hawaiian residency. The upper forest regions (of which the proposed HETF is comprised) were frequented by travelers, collectors of natural resources, and for a wide range of cultural practices (see Kamakau, 1961; and Boundary Commission Testimonies, 1873-1895, in this study). A system of trails, running *mauka-makai* (between mountains and shore), a near-shore trail (the *ala loa*), and trails skirting the upper forest region were established as well. All of the large *ahupua‘a* supported *mauka-makai* trails, while smaller *ahupua‘a*, shared trails, and access to the larger upland regions. By the time of westerners recording travel between the shore of Laupāhoehoe and the upper

mountain lands, the Laupāhoehoe-Waipunalei Trail had become the primary route of travel, with other trails only known to native residents of the land. The lower portions of the Laupāhoehoe-Waipunalei Trail, extending into the forest lands is marked on Kingdom Survey Map No. 667, dating from 1875, and indicated on later maps through the present-day.

Natural Resources and Land Management in the Hawaiian Cultural System

In Hawaiian culture, natural and cultural resources are one and the same. Native traditions describe the formation (literally the birth) of the Hawaiian Islands and the presence of life on and around them, in the context of genealogical accounts. All forms of the natural environment, from the skies and mountain peaks, to the plateau lands, watered valleys and lava plains, and to the shoreline and ocean depths are believed to be embodiments of Hawaiian gods and deities. One Hawaiian genealogical account, records that Wākea (the expanse of the sky–father) and Papa-hānau-moku (Papa, who gave birth to the islands)—also called Haumea-nui-hānau-wāwā (Great Haumea, born time and time again)—and various gods and creative forces of nature, gave birth to the islands. Hawai'i, the largest of the islands, was the first-born of these island children. As the Hawaiian genealogical account continues, we find that these same god-beings, or creative forces of nature who gave birth to the islands, were also the parents of the first man (Hāloa), and from this ancestor all Hawaiian people are descended (ref. David Malo, 1951; Beckwith, 1970; Pukui and Korn, 1973). It was in this context of kinship, that the ancient Hawaiians addressed their environment, and it is the basis of the Hawaiian system of land use.

In the generations that followed initial settlement, the Hawaiians developed a sophisticated system of land use and resource management. By the time 'Umi-a-Liloa rose to rule the island of Hawai'i in ca. 1525, the island (*moku-puni*) was divided into six districts or *moku-o-loko*. Hilo, extending from the sea to the mountain slopes of Mauna Kea, and on to the summit of Mauna Loa—through the *ahupua'a* of Humu'ula—is one of those six major districts (cf. Fornander, 1973–Vol. II:100-102).

The large districts (*moku-o-loko*) like Hilo, and sub-regions (*'okana* and *kalana*) like Hilo Palikū, were further divided into manageable units of land. These smaller divisions or units of land were tended to by the *maka'āinana* (people of the land) (see Malo, 1951:63-67). Of all the land divisions, perhaps the most significant management unit throughout the islands was the *ahupua'a*. *Ahupua'a* are subdivisions of land that were usually marked by an altar with an image or representation of a pig placed upon it (thus the name *ahu-pua'a* or pig-altar). In their configuration, the *ahupua'a* may be compared to wedge-shaped pieces of land that radiate out from the center of the island, extending to the ocean fisheries fronting the land unit. Their boundaries are generally defined by topography and geological features such as *pu'u* (hills), ridges, gullies, valleys, craters, or areas of a particular vegetation growth (see Boundary Commission Testimonies, 1873-1891; and C. Lyons, 1875, in this study).

The *ahupua'a* were also divided into smaller manageable parcels of land (such as the *'ili*, *kō'ele*, *mahina 'ai*, *māla*, and *kīhāpai*), that generally run in a *mauka-makai* orientation, and are often marked by stone wall (boundary) alignments. In these smaller land parcels the native tenants cultivated crops necessary to sustain their families, and supplied the needs of the chiefly communities they were associated with. As long as sufficient tribute was offered, and *kapu* (restrictions) were observed, the common people who lived in a given *ahupua'a* had access to most of the resources from mountain slopes to the ocean. These access rights were almost uniformly tied to residency on a particular land, and earned as a result of taking responsibility for stewardship of the natural environment and supplying the needs of ones' *ali'i* (see Malo, 1951:63-67 and Kamakau, 1961:372-377).

Entire *ahupua'a*, or portions of the land were generally under the jurisdiction of appointed *konohiki* or subordinate chief-landlords, who answered to an *ali'i-'ai-ahupua'a* (chief who controlled the *ahupua'a*

resources). The *ali'i-'ai-ahupua'a* in turn, answered to an *ali'i 'ai moku* (chief who claimed the abundance of the entire district). Thus, *ahupua'a* resources supported not only the *maka'āinana* and *'ohana* who lived on the land, but also contributed to the support of the royal community of regional and/or island kingdoms. In the Hilo District, the primary chiefly center, extended from the lowlands of Pi'ihonua to the shore of Waiākea, with outlying settlements situated at choice areas along the cliff-lined coast. Thus, Laupāhoehoe, with its near shore plain, fresh water resources, arable lands extending to the mountains, and fisheries, was one of the favored spots in antiquity.

In 1875, Curtis J. Lyons, son of Reverend Lorenzo Lyons, of Waimea, and one of the foremost surveyors of the Hawaiian Kingdom, authored a paper on "Hawaiian Land Matters" (Lyons 1875). In his discussion, he provided readers important references to the rights of native tenants on the *ahupua'a* of Humu'ula, which cuts off Laupāhoehoe in the upper forest and mountain region. He also discussed the relationship of these lands with one another, and the practices of the native tenants, as recorded by elder Hawaiians of the period. Speaking of the Hilo forest lands and the *ahupua'a* within them, Lyons' description is particularly important in the history of Laupāhoehoe and its upper forest lands (those of the proposed HETF), and he reported that:

...The ordinary *ahupuaa* extends from half a mile to 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, viz., Kahohe, to whose owners belonged the sole privilege of capturing the *ua'u*, a mountain-inhabiting but sea-fishing bird. High up on its eastern flank, however, stretched the already mentioned land of Humuula, whose upper limits coincide with those of the *mamane*, a valuable mountain *acasia*, and which starting from the shore near Laupahoehoe, extends across the upper ends of all other Hilo lands to the crater of Mokuaweoweo... [Lyons, 1875:111]

Traditions and historical records tell us that the practices of district subdividing and land use as described above, were integral to Hawaiian life, and were the product of strictly adhered to resource management planning. In this system, the people learned to live within the wealth and limitations of their natural environment, and were able to sustain themselves on the land and ocean.

Nā Wao—Traditional Knowledge of Environmental Regions in Hawai'i

In any discussion of Hawaiian land—*'āina*, that which sustains the people—and its place in culture, it is also appropriate to briefly discuss traditional Hawaiian land terms, as the terms demonstrate an intimate knowledge of the environment about them. We observe once again, that in the Hawaiian mind, all aspects of natural and cultural resources are interrelated. All are culturally significant. Native accounts and other historical writings record that the vast regional land divisions of Humu'ula and Ka'ohē, and the smaller *ahupua'a* such as Waipunalei, Laupāhoehoe, Kapehu, Welokā, and Maulua nui, which adjoin them on the lower mountain slopes, included a wide range of named environmental zones (*wao*). Each of these *wao* were noted for resources—extending from the sea to the forested lands, and in some instances, to the summits of the two mountains. It was these resources that sustained Hawaiian life, culture and spirituality.

Hawaiian customs and practices demonstrate the belief that all portions of the land and environment are related. Indeed, just as place names tell us that areas are of cultural importance, so too, the occurrence of a Hawaiian nomenclature for the *wao* tells us that there was an intimate relationship

between Hawaiians and their environment. Writing in 1869, Samuel M. Kamakau described the various regions and divisions of land. Of the mountains Kamakau observed:

...Here are some other divisions of the islands, together with their descriptive names.

Heights in the center or toward the side of a land, or island, are called *mauna*, mountains, or *kuahiwi*, “ridge backs.” The highest places, which cover over with fog and have great “flanks” behind and in front (*kaha kua*, *kaha alo*)—like Mauna Kea—are called *mauna*; the place below the summit, above where the forests grow is the *kuahiwi*. The peak of the mountain is called *pane po’o* or *piko*; if there is a sharp point on the peak it is called *pu’u pane po’o*; if there is no hill, *pu’u*, and the peak of the mountain spreads out like the roof of a house, the mountain is described as a *kauhuhu mauna* (house ridgeline mountain); and if there is a precipitous descent, *kaolo* [from the peak] to the *kauhuhu mauna* below this is called a *kualo* (“block”). If there are deep ravines (*‘alu ha’aha’ā*) in the sides of the mountain it is called a *kīhi po’ohiwi mauna* (“shoulder edge” mountain). A place that slopes down gradually (*hamo iho ana*) is called a *ho’oku’u* (a “letting down”); a sheer place is called a *pali lele koa’e* (cliff where *koa’e* birds soar), or a *holo* (“slide”), or a *waihi* (a “flowing down”). Rounded ridges that extend from the mountains or “ridge backs” or hills are called *lapa* or *kualapa* or *mo’o*—and, if they are large, *‘olapalapa* or *‘omo’omo’o*. Depressions between *lapa* or *mo’o* are *awawa*, valleys.

Mountain Zones

Here are some names for [the zones of] the mountains—the *mauna* or *kuahiwi*. A mountain is called a *kuahiwi*, but *mauna* is the overall term for the whole mountain, and there are many names applied to one, according to its delineations (*‘ano*). The part directly in back and in front of the summit proper is called the *kuamauna*, mountaintop; below the *kuamauna* is the *kuaheha*, and *makai* of the *kuaheha* is the *kuahiwi* proper. This is where small trees begin to grow; it is the *wao nahele*. *Makai* of this region the trees are tall, and this is the *wao lipo*. *Makai* of the *wao lipo* is the *wao ‘eiwa*, and *makai* of that the *wao ma’ukele*. *Makai* of the *wao ma’ukele* is the *wao akua*, and *makai* of there the *wao kanaka*, the area that people cultivate. *Makai* of the *wao kanaka* is the *‘ama’u*, fern belt, and *makai* of the *‘ama’u* the *‘apa’ā*, grasslands.

A solitary group of trees is a *moku la’au* (a “stand” of trees) or an *ulu la’au*, grove. Thickets that extend to the *kuahiwi* are *ulunahēle*, wild growth. An area where *koa* trees suitable for canoes (*koa wa’ā*) grow is a *wao koa* and *mauka* of there is a *wao la’au*, timber land. These are dry forest growths from the *‘apa’ā* up to the *kuahiwi*. The places that are “spongy” (*naele*) are found in the *wao ma’ukele*, the wet forest.

Makai of the *‘apa’ā* are the *pahe’e* [*pili* grass] and *‘ilima* growths and *makai* of them the *kula*, open country, and the *‘apoho* hollows near to the habitations of men. Then comes the *kahakai*, coast, the *kahaone*, sandy beach, and the *kalawa*, the curve of the seashore—right down to the *‘ae kai*, the water’s edge.

That is the way *ka po’e kahiko* named the land from mountain peak to sea. [S.M. Kamakau (in *Ke Au Okoa*, November 4 & 11, 1869; Kamakau, 1976:8-9)]

The native tradition of Ka-Miki, penned by native historians, John Wise, Isaac Kihe and a group of their associates (in *Ka Hoku o Hawaii*, 1914-1917), provides readers with a detailed account of Hawaiian land divisions and environmental zones. While competing in a riddling contest at the court of the chief, Palikū-a-Kīko’oko’o, the hero, Ka-Miki sparred with Pina’au, the foremost riddler of the district of Hilo Palikū (northern Hilo). The riddles covered topics describing regions from the mountain tops to the depths of the ocean, and descriptions of *kalo* (taro growth), the *ala loa* (trail systems), and *nā mea lawai’ā* (fishing practices). As the contest unfolded, it was seen that each of the competitors

were well matched. In one of the riddles, Ka-Miki described the various regions of the island of Hawai'i, extending from the mountain to the sea. Ka-Miki then told his opponent, that if he could rise to the challenge of answering the riddle, his knowledge could be compared to one who has ascended to the summit of Mauna Kea, described as the "*mauna o Poliahu*" (mountain of Poli'ahu) (in *Ka Hoku o Hawaii*, September 21, 1916).

Through one of the riddles, readers learn about the traditional *wao* of land, districts, and land divisions of the administrators who kept peace upon the land (diacritical marks and numbers have been added to these texts to facilitate correlation between Hawaiian and English narratives). The environmental zones include:

1–Ke kuahiwi; 2–Ke kualono; 3–Ke kuamauna; 4–Ke ku(a)hea; 5–Ke kaolo; 6–Kawao; 7–Ka wao ma'u kele; 8–Ka wao kele; 9–Ka wao akua; 10–Ka wao lā'au; 11–Ka wao kānaka; 12–Ka 'ama'u; 13–Ka 'āpa'a; 14–Ka pahe'e; 15–Ke kula; 16–Ka 'ilima; 17–Ka pu'eone; 18–Ka po'ina nalu; 19–Ke kai kohola; 20–Ke kai 'ele; 21–Ke kai uli; 22–Ke kai pualena; 23–Kai pōpolohua-a-Kāne-i-Tahiti.

1–The mountain; 2–The region near the mountain top; 3–The mountain top; 4–The misty ridge; 5–The trail ways; 6–The inland regions; 7 and 8– The rain belt regions; 9– The distant area inhabited by gods; 10–The forested region; 11–The region of people below; 12–The place of 'ama'u [fern upland agricultural zone]; 13– The arid plains; 14–The place of wet land planting; 15–The plain or open country; 16–The place of 'ilima growth [a seaward, and generally arid section of the *kula*]; 17–The dunes; 18–The place covered by waves [shoreline]; 19–The shallow sea [shoreline reef flats]; 20–The dark sea; 21–The deep blue-green sea; 22–The yellow [sun reflecting– sea on the horizon]; and 23–The deep purplish black sea of Kāne at Tahiti. (*Ka Hoku o Hawaii*, September 21, 1916; Maly, translator)

The elevational zones of almost daily activities ranged from the shore to around the 3,000 foot elevation. Above that, to around the 3,000 foot elevation, limited agricultural work was undertaken, and above that, specialized uses as those discussed earlier occurred. The *kawao*, *wao ma'ukele*, *waokele*, *wao akua*, *wao lā'au*, and *wao kānaka*, are traditional environmental/elevational zones that make up the Laupāhoehoe vicinity forest lands, and areas that were well known to the ancient Hawaiians.

It is important to note, that the upper rain forests over which cloud cover frequently settled, were called "*wao akua*" (region of the gods). The *wao akua* is so named because of the pattern of cloud cover and precipitation which settles upon the mountain slopes. This covering was interpreted as concealing from view, the activities of the gods and deities therein (cf. David Malo, 1959:16-18; and M.K. Pukui, pers. comm., 1975). The *wao akua* was considered sacred, and manmade features in the region would often be associated with ceremonial observances to ensure safe travel through the forest zone. At a lower elevation of the forest lands—nearer the 2,00-3,000 foot elevations, was the *wao kānaka*, the region frequented by mankind (*kānaka*), and from where resources were regularly collected and tended.

NATIVE HAWAIIAN TRADITIONS AND HISTORICAL NARRATIVES OF THE HILO PALIKŪ REGION AND THE MOUNTAIN LANDS

In Hawaiian *mo'olelo* (traditions and historical narratives) are found expressions of native beliefs, customs, practices, and history. Indeed, in Hawai'i, the very landscape is storied (*wahi pana*). Each place name was associated with a tradition—ranging from the presence and interactions of the gods with people, to documenting an event, or the characteristics of a given place. Unfortunately, today, many of those *mo'olelo* have been lost, though some still remain, and from them we are able to glimpse into the history of the lands and people of *Hilo Palikū*.

This section of the study presents readers with a collection of narratives written by native Hawaiian authors and historians, non-Hawaiian visitors and residents of the nineteenth and early twentieth century, documenting native lore and traditions of place names that have survived the passing of time; the occurrence of historical events; travel upon the land and through the forests; and of early changes in residency and land use. The narratives cited below are generally arranged in chronological order, by their sequence in history—earliest to most recent—and span the eras from antiquity to the 1930s.

The Rivalry Between Poli'ahu and Pele (Formation of the Laupāhoehoe Peninsula)

One of the prominent late historic collectors of Hawaiian lore, was W. D. Westervelt, who resided in Hawai'i between 1889-1939. Among the accounts collected by Westervelt, was one describing the conflicts between Pele (goddess of the volcanoes) and Poli'ahu (goddess of the snow covered mountain, Mauna Kea). In the narratives, we learn how Poli'ahu came to gain control over the northern portion of Hawai'i—and of the formation of Laupāhoehoe Peninsula; and that Pele retained dominance over the arid and volcanically active southern part of Hawai'i. In his tradition of “Pele and the Snow-Goddess,” Westervelt (1963) reported an eruptive event that took place after Hawaiian settlement (contrary to geological research) of the island group, explaining how Laupāhoehoe and Onomea Arch were formed. Westervelt writes:

Poli'ahu...loved the eastern cliffs of the great island Hawaii—the precipices which rise from the raging surf which beats against the coast known now as the Hamakua district. Here she sported among mortals, meeting the chiefs in their many and curious games of chance and skill. Sometimes she wore a mantle of pure white *kapa* and rested on the ledge of rock overhanging the torrents of water which in various places fell into the sea...
[Westervelt, 1963:55]

Westervelt then tells readers that once, when Poli'ahu and her companions were competing in the sport of *hōlua* (sledding), on the slopes of Mauna Kea, south of Hāmākua. There appeared among them a beautiful stranger, who was invited to participate in the sport with them. But, the woman instead:

...threw off all disguise and called for the forces of fire to burst open the doors of the subterranean caverns of Mauna Kea. Up toward the mountain she marshaled her fire-fountains. Poli'ahu fled toward the summit...Soon she regained strength and threw the [snow] mantle over the mountain...the lava chilled and hardened and choked the flowing, burning rivers... The fire-rivers, already rushing to the sea, were narrowed and driven downward so rapidly that they leaped out from the land, becoming immediately the prey of the remorseless ocean.

Thus the ragged mass of Laupahoehoe was formed, and the great ledge of the arch of Onomea, and the different sharp and torn lavas in the edge of the sea which mark the various eruptions of centuries past [Westervelt, 1963:61-63]

An Account of the Naming of Lands in the Maulua-Laupāhoehoe-Waipunalei Vicinity of Hilo Palikū

“*Kaao Hooniua Puuwai no Ka-Miki*” (The Heart Stirring Story of Ka-Miki) is about two supernatural brothers, Ka-Miki (The quick, or adept, one) and Maka‘iole (Rat [squinting] eyes), who traveled around the island of Hawai‘i along the ancient *ala loa* and *ala hele* (trails and paths) that encircled the island. During their journey, the brothers competed in contests alongside the trails they traveled, and in famed *kahua* (contest arenas) and royal courts, against ‘*ōlohe* (experts skilled in fighting or in other competitions, such as running, fishing, debating, or solving riddles, that were practiced by the ancient Hawaiians). They also challenged priests whose dishonorable conduct offended the gods of ancient Hawai‘i. Ka-Miki and Maka‘iole were empowered by their ancestress, Ka-uluhe-nui-hihi-kolo-i-uka (The great entangled growth of *uluhe* fern which spreads across the uplands), a body-form of the goddess Haumea (the creative force of nature—also called Papa and Hina—who was a goddess of priests and competitors).

The tradition was presented to the native newspaper, *Ka Hoku o Hawaii*, by noted Hawaiian historians, John Wise and J.W.H.I. Kihe, between 1914 to 1917. It is set in about the 1300s, at the time when Pili-a-Ka‘aiea (Pili) was sovereign chief of all Kona (ca. twelfth century). It was while on their journey that the brothers arrived at Maulua, and then traveled on to the famed *kahua* of Welokā, where Ka-Miki competed against champion warriors of the chief of Hilo Palikū. The traditions associate place names with people and events in history, and describe several sites and the landscape of the Hilo region. Among those significant features were the many valleys and streams, and the famed *koa* forests to whom the foremost warriors were likened (*koa* being a play on words, describing the *Acacia koa* trees and fierce warriors of the region).

The account also offers readers a glimpse into the poetry and attachment that Hawaiians share with the forests, rains and streams which were such an integral part of the Hilo landscape. The narratives below, are excerpted from the longer accounts, and translated by Maly for this study:

The region known as **Hilo Palikū** stretches from the northern bank of Wailuku River to the gulch of Ka‘ula, and is described in the saying—

O Hilo Palikū kāhi i ‘ōlelo ‘ia ai; Pau ke aho i ka hele o Hilo, he lau ka pu‘u, he mano ka ihona, he kīni nā kahawai, a e ‘au no ho‘i i ka wai o Hilo a pau ke aho, a‘ohe e pau ka wai!

Of Hilo Palikū it is said, one becomes short of breath traveling through Hilo, for there are many (400) hills, many (4,000) areas to descend, and many (40,000) streams, indeed while swimming through the waters of Hilo one becomes out of breath, but one is never out of water at Hilo!

After traveling through the southern lands of Hilo Palikū, Ka-Miki and Maka‘iole and their companions Keahialaka and Hilo Hanakāhi, headed to the compound of the chief, Maulua-a-pio, for whom the *ahupua‘a* of **Maulua** was named. Maulua-a-pio was one of the foremost ‘*ōlohe* masters of the Hilo District, and it was Maulua from whom the chief Hilo Hanakāhi had learned his fighting skills.

Hilo Hanakāhi had traveled ahead of Ka-Miki and his companions, to speak with his instructor, Maulua. He told him of Ka-Miki’s nature, and asked that Maulua accept Ka-Miki as an *aikāne* (companion). Maulua agreed to meet Ka-Miki, but also desired to test

the knowledge of Ka-Miki for himself, thus the group was invited to join Maulua at his *hālau le'ale'a* (competition long-house).

Ka-Miki and his companions arrived at Maulua and joined the chief of that name for a meal and 'awa ceremony. As Maulua prepared to make the 'awa, Ka-Miki asked if he could strain the drink. Maulua responded; "You are visitors, and it is only right that I should serve you." Ka-Miki responded with the saying:

He kī'i kanaka noho wale o kāhi ali'i, o ka mea miki no ma ka hana, ku no imua o ke ali'i!

(Only an image sits doing nothing at the dwelling place of a chief, and the one skilled at a task stands before the chief!)

Maulua agreed to Ka-Miki's request, and following the 'awa ceremony, Maulua determined that he wanted to challenge Ka-Miki to a contest. The intent of Maulua was known to Ka-Miki and he spoke a riddle to him, in which he named a wind of the region, and of omens seen in the weather:

He lā makani ka ho'i kēia o Koholālele, ke lele nei ka huna o ke kai iluna o nā pali, pali kahakō a ke koa'e e lele ai i ka ho'ōulu a ka Ulumano ka makani ho'ōulu-a o nā makalae. E 'ino, 'ino paha auane'i o Hilo, 'ino ke ala, ua ku nā pali laumania a ka lawai'a nihi ai ku'uku'u i ke kaula a ke 'aki ala i ka niho! –

This is indeed a windy day at Koholālele, the sea mist flies above the cliffs, steep cliffs from which the tropic birds fly rising on the *Ulumano*, the wind which rises from the shores. It is perhaps a storm, a storm in Hilo, a storm along the paths on the sheer cliffs on which the fishermen tie their ropes and let them down to the nipping teeth [waves].

Maulua responded, "Where is the storm, all is calm, there are no waves upon the shore, the cool *Malanai* breeze blows along the cliffs of the *hula'ana* (cliff trail which one swims to pass).

Ka-Miki told Maulua, "It is the voice of the birds of my ancestresses which tell me that soon the storm shall arrive."

Responding to Ka-Miki Maulua said, "This is peculiar and you are mistaken, for indeed the gentle *Malanai* wind is blowing. What bird is it which speaks so?" Ka-Miki answered:

O ka leo o ka manu a ku'u kupuna wahine ke kani nei... O ka 'a'o ka manu heahea pili o ke ao, a 'oia ka'u i lohe aku la i ka holo-kē, a ua ma'a loa au, i ka wā e lohe 'ia ai kona leo e holoholo ana i ka wā mālie, e mākaukau, e liuliu... eia ku ka 'ino e hō'ea mai ana a'ole i lō'ihī loa.

It is the bird of my ancestress which calls out. The 'a'o (*Puffinis newelli*) bird which announces the arriving daylight, this is what I have heard in their scattered voices, and I know that when I hear their voices that the calm is about to depart, it is time to make ready and prepare, for in a short time the storm will arrive.

While Ka-Miki and Maulua discussed the names of the 'ōlohe in the Hilo Palikū region, we find reference to the "mysterious" *koa* trees, for which the region is noted:

“Kalele-a-Welokā is the *‘ōlohe* who is filled with knowledge and strength, he is the *kaulana ‘āina* (champion who maintains peace in the land) of the chief Palikū-a-Kiko‘oko‘o. He has a full muscular body, like the mysterious *koa* trees which surround Hilo, there is no other like him.”

Ka-Miki then told Maulua, “He is indeed a great warrior, but the *Kona* wind is coming to scatter the branches of this *koa* tree.” Maulua told Ka-Miki, “Where is this *Kona* wind which will knock over the tall dark *koa* of Hilo? This wind may knock over the *koa* of **‘Umikoa**, but not the great *‘ōlohe*, the *a‘u* (sword fish) which leaps upon the waves, the *‘ahi kananā* (fierce tuna fish) of the deep sea, the *manō niuhi* (great man eating shark) of the dark ocean depths!”

Maulua continued debating with Ka-Miki, and Hilo Hanakāhi called to his teacher, “I have fully explained the nature of this one who is here before you. If you continue in this manner, you will become like the little pebble knocked over in *kōnane*, and set aside in a little bundle.” Maulua did not answer, but instead leapt to try and surprise attack Ka-Miki. Though he tried all manner of *lua* (techniques), Maulua was worn out and bound by Ka-Miki, unable to move.

Ka-Miki told Maulua, “You have been bound in the net, twined from the hair of *Ka-uluhe-nui-hihi-kolo-i-uka*.” With a smile, Ka-Miki then thanked Maulua for the test, telling him, “You are one of the best competitors I have met, there is but one problem, you are quickly worn out, you have no strength (a play on the name of the land Maulua, where one becomes wearied from traveling the steep valley cliffs). Therefore, let this test between Ka-Miki and Maulua be ended, unless you be killed like one who travels the precipitous cliff trail of Nu‘alolo, falling like the fire brands of Kāmaile, or the flying fire darts, the fluttering tribute of Makua-iki. Because you are a teacher of Hilo Hanakāhi, my traveling companion, I will release you.”

Maulua agreed to the conditions of Ka-Miki and then described the nature of Welokā:

Welokā stood nearly twelve feet tall, and he was a master in many *‘ōlohe* techniques including, *hauna lā‘au, kāwala lā‘au, ka hāpai a kiola, ka hopu a ha‘iha‘i, a he māmā ma ka lele pali me ke kūkini, a he akamai ma ka nou pōhaku...* (fighting with war clubs and spears, lifting and throwing one’s opponent from the arena, seizing and bone breaking, also, an expert cliff leaper and runner, and extremely clever at sling stone fighting.

Maulua took Ka-Miki and his companions to the compound of the chief Palikū-a-kiko‘oko‘o (Palikū), and arrangements were made for Ka-Miki to compete with Kalele-a-Welokā. Palikū sent his runner **Kapehu-a-lālā** (Kapehu) to the uplands of **‘Awapuhi**, where Kāwalalā‘au-a-hu‘eku (the master war club instructor) dwelt and taught his students. Kāwalalā‘au agreed that he and Welokā, his foremost student, and the champion of Palikū-a-Kiko‘oko‘o would join the chief and his other competitors. While waiting for the arrival of Kāwalalā‘au *mā*, Ka-Miki met with, and entered into a debate with Pina‘au-iki-a-Kawelo, the foster son and riddler champion of Palikū-a-Kiko‘oko‘o.

Welokā and Kāwalalā‘au then arrived at the *hālau* of Palikū, and the *kahua* was made ready for the contest between the champion Welokā and Ka-Miki. All of the *‘ōlohe* from ‘Awapuhi to **Ka‘ula**, and the chiefs who upheld the laws of Palikū-a-Kiko‘oko‘o assembled for the contest between Welokā and Ka-Miki. Those assembled included **Pāpa‘aloha, Kihalani, Manowai‘ōpae**, and **Pu‘u ‘Alaea**. The chief **Laupāhoehoe** was ill and did not attend. The twin chiefesses **Waipunalei-a-Haho** (daughters of Palikū-a-Kiko‘oko‘o), their guardian **Hōkū-lī-a-lei** (now called Hōkūlī), the seer **Nākāpa‘a**, and his brother **Ka‘awali‘i-a-lohelohe**, (called Ka‘awali‘i, who was the messenger- runner of the

chief Lupea – **Kahauoluapea**), and his sister **Kaohaohalani** (called Kaohaoha), **‘Ō‘ōkala-ku-nahihī-nā-hulu-i-kamaha** (now called ‘Ō‘ōkala), and **Ka-‘ula-ku-‘i-a-lua** (now called Ka-‘ula), were also among those assembled at the *kahua*. These were famous people of Palikū’s time, and lands are named for all of them.

When Welokā and Kāwalalā‘au arrived at the contest site, Palikū-a-Kīko‘oko‘o asked Ka-Miki what method of contests he might compete in? Ka-Miki responded that any technique was fine, and agreed upon competing in the spear and club fighting techniques of – *‘ōka’a lā’au*, *kāwala lā’au*, and *hauna lā’au*. Ka-Miki then called in a *mele* (chant) to Maka-‘iole to go and fetch the club *‘Ōlapa-ka-huila-o-kalani*, the cherished one of *Kaulu-i-ke-kihi-o-Kamalama* at Kalama‘ula:

<i>E ala e kīko‘oko‘o ka mauna</i>	Arise and span the mountain
<i>E ala e kīko‘oko‘o ka moana</i>	Arise and span the sea
<i>E ala e kīko‘oko‘o ka makani</i>	Arise and span the wind
<i>E ala e kīko‘oko‘o ka ua</i>	Arise and span the rains
<i>E ala e kīko‘oko‘o ka uila</i>	Arise and span the lightning
<i>E ala e kīko‘oko‘o ka pō</i>	Arise and span the darkness
<i>E ala e kīko‘oko‘o ke ao</i>	Arise and span the light
<i>E ala e ka ‘iole nui manomano</i>	Arise o many formed <i>‘iole</i> (Maka-‘iole)
<i>E ala e Ka-huelo-ku-Kamalama</i>	Arise o Kahuelo-ku
<i>lā kīko‘oko‘o a lele pu‘ō</i>	Span and leap over
<i>lā kīko‘oko‘o a lele puahiohio</i>	Span and fly like a whirlwind
<i>lā kīko‘oko‘o a lele pua-nei</i>	Span and fly forth
<i>lā kīko‘oko‘o a lele ka-wa</i>	Span and leap as at the <i>kawa</i> site
<i>lā kīko‘oko‘o la a lele mamao loa</i>	Span and leap a great distance
<i>‘Oia, a lele la, a lele ka manu o Halulu</i>	It is so, fly, fly like the bird <i>Halulu</i>
<i>E Kahuelo-ku-e, ki‘iina ka lā’au a kāua</i>	O Kahuelo fetch the club of ours

Upon hearing Ka-Miki’s chant, Maka-‘iole flew like a *pua pana* (an arrow), and was lost from sight. Arriving before his ancestress, she greeted him and inquired of Ka-Miki, and chanted out in his praise upon hearing of his contest. Maka-‘iole then returned to Ka-Miki and presented the war club *‘Ōlapa-kahuila-o-ka-lani* to him.

Ka-Miki then called out to Palikū, “Who is the contestant of this day?” Palikū responded, “Kalele-a-Welokā, and Kāwalalā‘au is the official-overseer.”

Kāwalalā‘au then moved to the *kahua* and called to Ka-Miki, “The method of fighting will be with clubs and spears, and death shall be the sign of victory. Beware o youth lest you be cut in two by the club of my student, Kalele-a-Welokā.”

Welokā then leapt upon the *kahua* to attack Ka-Miki, and Kāwalalā‘au called out to Welokā, telling him to attack in the manner of *‘Uhae-a-kī‘ilīlī-pua-hau o Kalena*, thinking that Ka-Miki was inexperienced, Welokā struck to kill, but missed. Kāwalalā‘au then called out to Welokā that he should strike in the method of *Ka piko o Wākea*. Once again Ka-Miki dodged the attack, and Kāwalalā‘au then understood that Ka-Miki was a true expert.

Welokā continued to fight, but was worn out without once striking Ka-Miki. Now there was no competitor who hadn’t previously fallen to Welokā, and Welokā was outraged, that each of his attacks had been thwarted. As Kāwalalā‘au continued calling techniques out to Welokā, Ka-Miki understood that Kāwalalā‘au was the real master with whom he would compete. Ka-Miki called to Welokā, telling him that he would soon be caught by Ka-Miki the reflection or image of the war club of *Ka-uluhe-nui*. Welokā struck at Ka-Miki with his

war club *Ku'ika'a*, and the club sank into the ground where it was firmly held. While Welokā attempted to free his club, Ka-Miki struck at *Ku'ika'a* and it shattered. Using the *hauna lā'au* (war club) fighting technique of *Nī'au-a-pi'o*, Ka-Miki then prepared to strike Welokā. Kāwalalā'au understood the nature of this technique and leapt to protect his student, but Welokā was hit on the leg. Thus Welokā, the champion of Palikū-a-Kīko'oko'o was unable to fight again.

Welokā was carried into a nearby *hālau*, and Kāwalalā'au was so outraged by his students' defeat, that he turned to fight Ka-Miki. Kāwalalā'au was a master instructor of *kākā lā'au* (spear fighting), *lua* (rough hand-to-hand combat), *ha'iha'i* (bone breaking), and all manner of fighting. Kāwalalā'au was amazed and surprised that Kalele-a-Welokā had fallen before Ka-Miki, thus he greatly desired to fight with this warrior who had defeated his foremost student, and bound Maulua-a-pio.

Kāwalalā'au leapt to strike at Ka-Miki, but Ka-Miki dove down and caught Kāwalalā'au and threw him from the *kahua*. All of those assembled were astonished to see the master instructor of Hilo Palikū so defeated. Kāwalalā'au quickly rose, furious that he had been treated like a little bundle which was cast aside. This was the first time that he had been so humiliated, and no *ōlohe* had ever beaten him. Kāwalalā'au leapt to try and seize Ka-Miki, but he misjudged and was struck to the ground and held securely. When Ka-Miki released Kāwalalā'au, they competed in *lua*, but Kāwalalā'au could gain no advantage, thus Kāwalalā'au understood that Ka-Miki was a master of all forms of fighting.

Ka-Miki praised Kāwalalā'au saying he was indeed knowledgeable, one of the foremost *ōlohe* he had encountered. Ka-Miki then asked Kāwalalā'au if they could compete as friends. Kāwalalā'au agreed, and said "let us return to our first form of competition, *ōka'a lā'au* and *hauna lā'au*, then we might learn the extent of our teachers skills." Those gathered at the contest site saw that Kāwalalā'au and Ka-Miki were both exceptionally skilled. Now Kāwalalā'au's true intent was to kill Ka-Miki, so he took his war club *Kaulilua* and assumed the posture of *Ka piko o Wākea* for attack, and *Lele-a-kuhō* for protecting against attacks.

Seeing Kāwalalā'au's true intent, Ka-Miki called out, "Beware lest you be enclosed in *Ku'uku'u-iki-a-kuhō*, the little toe of my teacher *Ka-uluhe-nui-hihi-kolo-i-uka*, my teacher who is hidden there at the thigh channel of *Haumea-nui-a-ke-aīwaiwa*."

Upon hearing the names of the club, fighting technique and goddess *Haumea*, Kāwalalā'au realized that this youth was led by his gods. He also remembered that his teacher had told him never to compete with one who called upon *Haumea-nui-a-ke-aīwaiwa*.

Ka-Miki then chanted out, describing the nature of Kāwalalā'au, and called upon the forces of nature and *Haumea* to assist him:

<i>O kīko'oko'o ka mauna o 'akāhi ka pili</i>	Span the mountain, there is one that is close by [a competitor]
<i>O kīko'oko'o ka moana o 'akāhi ka pō</i>	Span the ocean, there is one darkened [ignorant]
<i>O kīko'oko'o ka ua o lapakū o 'alua ka pili</i>	Span the rains, striking at the two which are bound together
<i>Pau mai ka lālā kamahēle a ka ēulu</i>	Finished are the far reaching branches [warriors], topped off
<i>Pau mai ka ēulu a ka lālā kāpa'i</i>	The branches have been cut and shattered
<i>Pau mai ka lālā kāpa'i a i ka honua</i>	The branches have shattered upon the earth

Honua ku a lewa ka lani iā Haumea

*lā Haumea niho 'oi wakawaka kuku
'Ai humuhumu a'ohē mea koe
Koe no he aiwaiwa he hialōloa*

E Kāwalalā'au-a-hu'eku-ka-lani-e

The earth which rises to the heavens,
to Haumea

To Haumea with the sharp jagged teeth
Who consumes all, leaving nothing behind
Indeed if you were to remain, you would
be a true master, an expert,
Hail Kāwalalā'au...

Ka-Miki then leapt at Kāwalalā'au and threw him from the *kahua* to where he landed in front of Palikū-a-Kiko'oko'o mā. Thus the saying of Kāwalalā'au came into use—

Hina la e Kāwalalā'au, ke koa lālā 'ole pā'elekū i ka lani ka holoua o Hilo!

Fallen is Kāwalalā'au, the great dark branchless *koa* trees of Hilo,
Hilo placed in the rain trough of the heavens.

Kāwalalā'au broke his thigh bone and was unable to fight again. Ka-Miki then called out, “All have fallen to Ka-Miki, the image of the war club of *Ka-uluhe*, is there no one to compete with; who will be the *'ōlohe* to compete with Ka-Miki?” The chief Palikū-a-Kiko'oko'o answered, “No *'ōlohe* remain.” Ka-Miki then asked him, “And what are the tasks of these people who fill the house of the chief?” Palikū-a-Kiko'oko'o responded, “All of them have one teacher, Kāwalalā'au.”

Ka-Miki then said, “Since no *'ōlohe* remain in Hilo, my task is finished, all have been bound by Ka-Miki, in the net of my ancestresses. Do you agree to serve me the food and resources of the land?”

After conferring with his foster son Pina'au, Palikū responded, “Not all manner of *'ōlohe* are defeated, for there are many areas of knowledge.” As the discussion continued, it was agreed that Ka-Miki would compete in *'ōlelo ho'opāpā* (debating and riddling) contests with Pina'au. Failure to answer on the part of either Pina'au or Ka-Miki meant death to the loser, who would be “*Kālua 'ia i ka imu*” (baked in the *imu*). The riddling contests described *kalo* (taro growth), the *ala loa* (trail systems), *lawai'a* (fishing practices), and the shark god of Ka-Miki, *Niho'eleki*.

The narrative of the riddling contest provides readers with a description of traditional land divisions (numbers in square brackets added to help the reader identify the Hawaiian and English texts for land areas described):

[1] *Ka moku i puni i ke kai, 'oia ka moku puni e like me ka moku o Hawai'i nei*; [2] *Ka moku oloko, 'oia nā 'okina o ka moku. He moku o Hilo, he moku o Hāmākua, he moku o Kohala, he moku o Kona, he moku o Ka'ū, a he moku o Puna, a o nā ali'i e noho ana ma ia mau moku he mau ali'i 'aimoku ia*; [3] *Ka 'okana*; [4] *Ke kalana*; [5] *Ke ahupua'a*; [6] *Ke kūpono*; [7] *Ka 'ili 'āina*; [8] *Ka paukū 'āina*; [9] *Ka lele o ke ahupua'a*; [10] *Ke kō'ele*; [11] *Ke kihāpai*; [12] *Ka māla*; [13] *Ka hakuone*; [14] *Ke kuakua, o ke kuakua 'oia nā kīpoho kalo, 'uala a pēlā wale aku i kanu 'ia a ulu, a'ohē nui o nā mea ulu maloko o laila...*

[1] An is land which is encircled by the ocean is called *moku puni*, like the island of Hawai'i; [2] The interior island, those are the districts of the island. Hilo is a district, and Hāmākua is a district, as are Kohala, Kona, Ka'ū, and Puna, and the chiefs which rule these districts are the ones who consume the district — *ali'i 'ai moku*; then there are smaller divisions as [3] the *'okana*; and [4] the *kalana*; then the [5] *ahupua'a*; and smaller agricultural sub-divisions which include [6] *kūpono* (lands held as inheritance); [7] narrow parcels of land; [8] segments of land; [9] parcels which are shared between *ahupua'a*; [10] parcels worked for the chief; [11] garden parcels; [12] dryland gardens; [13] chiefs

parcels; and [14] the *kuakua* area which is a place where shallow planting of taro, sweet potatoes and such are planted to grow between rows of rocks/lava, things do not grow abundantly between the *kuakua*...

Ka-Miki then challenged Pīna'au with a riddle which described the nature and extent of his journey around Hawai'i. Pīna'au answered much of the riddle and determined that only the districts of Hāmākua and Kohala remained to be visited on this journey.

Ka-Miki praised Pīna'au's great skills, saying he had never met anyone as capable as him. Ka-Miki then released Palikū-a-Kīko'oko'o and Pīna'au from the death *kapu* which had been set upon the riddling contest. Ka-Miki and Pīna'au continued competing as friends, and when the contest was over, Ka-Miki commended both Pīna'au and Ka'awali'i to cherished positions under their chiefs. Pīna'au served as *konohipi* (overseer) for the lands of Palikū-a-Kīko'oko'o, and the lands of Ka'awali'i, Nākāpa'a, Kahauoluapea, Kaohaoha, 'Ō'ōkala, and Ka'ula were all named for the *kaulana 'āina* (foremost land administrators) of Palikū-a-Kīko'oko'o. Ka-Miki released those *'ōlohe* who had been bound, and several days of feasts, *'awa* ceremonies and festivities were passed, before Ka-Miki *mā* departed for Hāmākua... [Wise and Kihe in Ka Hoku o Hawaii, March 30th, to September 28th, 1916; Maly, translator]

Residence of 'Umi a Līloa (King of Hawai'i Island) In the Waipunalei-Laupāhoehoe Vicinity

Writing between the 1830s to 1870s, noted Hawaiian historians David Malo (1951), John Papa I'i (1959), and Samuel Kamakau (1961 & 1964), recorded events in Hawaiian history dating from ca. 1520 A.D., in which we find references to lands of Laupāhoehoe and vicinity.

In his chapter on the chief 'Umi a Līloa ('Umi), Malo (1951) reported that:

...Umi was the son of Līloa, but not his first son. The name of his first son was Hakau, whom he begot by Pinea, the regular wife of Līloa. Hakau was considered a very high chief, because Pinea was of the same *alii* rank as Līloa, owing to the fact that Līloa's mother, Waiolea, was the elder sister of Pinea.

2. Umi was the child of Līloa by a woman whom he seduced, named Akahi-a-kuleana. She has often been spoken of as a person of no *alii* [page 257] blood, but the fact is that she was of the same *alii* line as Līloa himself. They were both descendants of Kanipahu... [Malo, 1951:258]

Malo tells us that Akahi-a-kuleana resided at Kealakaha, near the boundary between the districts of Hāmākua and Hilo. Upon departing from Akahi-a-kuleana, Līloa left her certain royal items she was to give to the child born of their union, and by which he (Līloa) would know his son. Indeed, a child was born, a son ('Umi), and as he grew up, he was noted for his exceptional skills. One of his favorites that he enjoyed was surfing, and the famed surf, fronting Laupāhoehoe was one of his favorite spots for the sport. We also find that when 'Umi went to Waipi'o, the seat of his father's kingdom, he was affectionately greeted by Līloa, but spitefully treated by Hakau, his elder, half brother. As a result, upon the death of Līloa, 'Umi fled from Waipi'o, to live in secrecy near his birth place. 'Umi and his companions lived at Waipunalei and vicinity, in the district of Hilo (Malo, 1951:258-263). Malo reported that while 'Umi and his friends were residing here, they all married, and lived as commoners upon the lands. Though 'Umi did not toil in the planting fields or in the *aku* fishery, as did his companions. He also wrote of 'Umi's surfing at Laupāhoehoe:

72. On one occasion they went down to the ocean at Laupahoehoe and engaged in surf bathing (*kaha nalu*), in which Umi was of superior skill; and Umi raced with one Paiea.
73. And as they were coursing, Paiea rudely crowded over onto Umi, so that his board came violently in collision with Umi's shoulder and hurt him severely. This was the fault, on account of which Umi afterwards put Paiea to death, he having then succeeded to the government of the island.
74. When it came to the season for *aku*, Pii-mai-waa, Omao-kamau, and Koi went trolling for *aku* along with the men of the place.
75. Their fathers-in-law were delighted when they got the fish, but the fathers-in-law of Umi were very much put out because he did not go for *aku* with the fishermen of the region.
76. Umi's fathers-in-law said to Umi's wives, "If this fat husband of yours were only a fisherman now, we would have some *aku* to eat; but as it is, you are wasting yourselves on this man."
77. On one occasion when the fishermen saw that Umi was a strong fellow they invited him to go *aku* fishing with them, and he consented. They did not know that he was an *alii*, though the disappearance of Umi had become notorious; nor did they know that his name was Umi.
78. While they were fishing, Umi noticed that when a fisherman took in a fish he passed it between his legs (*poho-lalo*) in putting it into the canoe, and when it came to the division of the fish, he would not use as food for himself such as had been treated in this way.
79. But he exchanged the fish thus obtained for those of another fisherman, whose fish had been passed over the fisherman's shoulder, saying to him, "Give me your small fish, and take in exchange these large fish as yours;" to which the other readily agreed.
80. Umi would not eat of these fish, but took them as an offering to his god Kaili, which he kept in a secret place near the residence of Hokuli.
81. When Kalei-o-ku, the prophet, noticed that as often as Umi went a-fishing, which was very frequently, a rainbow appeared over the patch of calm water in the ocean that surrounded him (*malau*), and he said to himself, "Perhaps this is Umi," for he had heard of Umi's disappearance.
82. Accordingly Kalei-o-ku came down to where Umi was living, bringing with him a pig as an offering. And when he arrived at Umi's place of residence, he found him living in a lordly fashion and said to himself, "This man is an *alii*."
83. He immediately offered the pig, at the same time repeating this prayer, "Here is a pig, O God, a pig for the purpose of detecting an *alii*." [page 264] Then Kalei-o-ku released the pig, and it went and stood before Umi; after which it came back to Kalei-o-ku.
84. Kalei-o-ku then put to him the question, "Are you Umi?" "I am he," said Umi. "Let us go then to my place," said Kalei-o-ku, and Umi consented and went with him. Thereupon his fathers-in-law and all the people of the neighborhood said, "So then this man is an *alii*, and his name is Umi, the son of Liloa. He is that one of whom we heard some time ago that he was lost."
85. Then Umi, his wives, Pii-mai-waa, Omao-kamau, and Koi, and their wives, accompanied Kalei-o-ku to his residence... [Malo, 1951:265]

To this story, Samuel Kamakau (1961) added that upon departing from Waipi'o, 'Umi and his companions first lived in the forest lands above Hilo, at the place called Laumai'a on the land of Humu'ula. It was here, that Pi'imaiwa'a, one of 'Umi's trusted companions could catch birds for them to eat (Kamakau, 1961:10). Kamakau also expanded upon the accounts of surfing and *aku* (bonito) fishing at Laupāhoehoe:

When the season came for bonito (*aku*) fishing down at Laupahoehoe, the harbor from which those of that land went fishing, his adopted sons went too. They obtained bonito whenever they went out because they helped to man the canoes.

'Umi and his wives went sea bathing, surfing (*he'e nalu*), riding on the surf (*kaha nalu*), and a certain chief of Laupahoehoe noticed [page 10] 'Umi's skill in surf-riding. His name was Pai'ea, and he knew all the surfs and the best one to ride. It was the one directly in front of Laupahoehoe, facing Hilo. It was a huge one which none dared to ride except Pai'ea, who was noted for his skill. Gambling on surfing was practiced in that locality. All of the inhabitants from Waipunalei to Ka'ula placed their wager on 'Umi, and those of Laupahoehoe on Pai'ea. The two rode the surf, and while surfing Pai'ea noticed that 'Umi was winning. As they drew near a rock, Pai'ea crowded him against it, skinning his side. 'Umi was strong and pressed his foot against Pai'ea's chest and then landed ashore. 'Umi won against Pai'ea, and because he crowded 'Umi against the rock with the intention of killing him, Pai'ea was roasted in an *imu* [in later years]. [Kamakau, 1961:11]

Regarding the place named Hōkuli, Kamakau described it as being along the trail into Waipunalei, a cave, in which 'Umi hid, for a time, the god, Kū-kā'ili-moku (ibid.:11).

Kūpuna and *kama'āina* knowledge, recorded through oral history interviews, share additional associations of 'Umi with activities in the region. There is a noted locality in the upper *koa* forests of the region, called 'Umikoa (literally, 'Umi's *koa* trees). 'Umikoa is situated at approximately the 3,500 foot elevation, in the *ahupua'a* of Koholālele (Hāmākua District), it was traditionally in the *koa* forest belt, that extended across the Hāmākua and Hilo districts. From the time of 'Umi (ca. 1520), through the time of Kamehameha I's battles (ca. 1780s-1790s), the rich *koa* forests were frequented by canoe makers under chiefly and priestly direction, and great fleets of canoes were made to supply the needs of the chiefs in their efforts to build their kingdoms.

The Waipunalei-Laupāhoehoe Trail, connected with the 'Umikoa Trail, via the Laumai'a Trail just in the upper edge of the larger forest zone (where the *koa* and *māmane* trees mixed together). The Waipunalei-Laupāhoehoe and 'Umikoa trails also converge in Ka'ohē Ahupua'a and run up to the summit of Mauna Kea. It was via this trail that ceremonial pilgrimages were made, that adze makers traveled to the Keanakāko'i quarries, and that travel to the upper mountain lands was done to accomplish personal family matters—such as the burial of loved ones and the hiding of the *piko* (umbilical cords) of newborn children. Elder *kama'āina* recall that through the early 1900s, Hawaiians traveled to selected areas of the Hilo and Hāmākua forests to search out trees adequate for canoes to be used in fishing (see oral history interviews in this study). Indeed, one of the earliest photographs of the region, dating from 1885, depicts a roughed out canoe and another log, felled behind it, in the Hilo forest lands (*Figure 2*).

Battles of Kamehameha I at Laupāhoehoe and Vicinity in ca. 1785

In the 1780s, Kamehameha I was moving to consolidate the rule of Hawai'i Island, bringing it under his control. In his quest, he and his warriors met around the island in battles with parties of warriors under rival chiefs of Hawai'i and Maui. Native historian Samuel Kamakau (writing in the late 1860s), and Reverend Stephen Desha, Sr. (writing in the 1920s) described events around those battles and made references to events in Laupāhoehoe and vicinity—including travel through the forest region of Laupāhoehoe, and battles fought at various elevational zones.



Figure 2. *Roughed out Canoe at the 4,500' Elevation in Dense Koa forest on Slopes of Mauna Kea, above Hilo (September 11, 1885) (E. Arning Photo No. 1.172, in Collection of Hawaiian Historical Society) (Copy Photo KPA-N1016)*

Kamakau (1961) recorded that Kamehameha and his forces were met at Pana'ewa in Hilo, where:

...he met the war party of Ka-hekili which had been sent to the aid of Keawe-ma'u-hili under Ka-haha-wai. Moa, who saw the encounter with his own eyes, says that these men of Ka-haha-wai were soldiers without equal. They surrounded the forces of Kamehameha on all sides... The *pololu* spears and the *ihe* spears rained down like bath water; blood flowed like water and soaked into the dry earth of that hill... Kamehameha's forces were badly used in these battles. Ka-lani-malokuloku-i-ke-po'o-o-ka-lani was almost killed at Hala'i. The army was saved only by getting to the sea and going aboard Ke'e-au-moku's fleet. A soldier named Mo'o who followed Kamehameha is reported to have said, "O heavenly one! do not run away in fright; it is only I." Since Keawe-ma'u-hili and Keoua had joined forces against Kamehameha there was no place for him in Hilo; he camped his men at *Laupahoehoe* in Hilo Paliku (Hilo by the cliff).

Afterwards Kamehameha and Ka-haku'i paddled to Papa'i and on to Kea'au in Puna where some men and women were fishing, and a little child sat on the back of one of the men. Seeing them about to go away, Kamehameha leaped from his canoe intending to catch and kill the men, but they all escaped with the women except two men who stayed to protect the man with the child. During the struggle Kamehameha caught his foot in a crevice of the rock and was stuck fast; and the fishermen beat him over the head with a paddle. Had it not been that one of the men was hampered with the child and their ignorance that this was Kamehameha with whom they were struggling, Kamehameha would have been killed that day. This quarrel was named Ka-lele-iki, [page 125] and from the striking of Kamehameha's head with a paddle came the law of Mamala-hoe (Broken paddle) for Kamehameha.

While Kamehameha was encamped at *Laupāhoehoe*, Aka-lele was sent by Ka-hekili to Hilo with strong paddlers to bring back Ka-haha-wai's war party to Maui in order that they might go to war with Ka-hahana on Oahu, and Keawe-ma'u-hili consented to their going, since he had an ally in Keoua. He gave them new canoes for Ka-hekili, and Keoua did the same. When the party was ready to start for Maui, Ka-haha-wai directed the canoes by way of *Laupāhoehoe*, to meet Kamehameha. When he met the chief he said, "Is it to be face up or face down?" (*iluna ke alo, ilalo ke alo*) [meaning, is the sentence to be life or death?]. Kamehameha knew that Ka-haha-wai was a man sacred (*la'a*) to Ka-hekili and was not to be slain; Kikane again was a man sacred to Kamehameha, and he answered, "It is not death." Ka-haha-wai said, "It does not matter about the others; I came to you, O chief! to put my life or death in your hands lest you should say that I ran away." Then Ka-haha-wai returned to Maui with his party and once more joined Ka-hekili. Kamehameha and his followers remained at *Laupāhoehoe*, but being unable to defeat the combined forces of Keawe-ma'u-hili and Keoua, he removed to Hala'ula and Hapu'u in Kohala... [Kamakau, 1961:126]

Kamehameha and his forces returned once again to *Laupāhoehoe* and the Hilo lands to fight with the forces of the windward chiefs. Kamakau recorded that:

Kamehameha and his followers left Kohala and went once more to battle in Hilo against the two opposing chiefs of Ka-u and Hilo, but in spite of hard fighting they remained undefeated. This battle was called Hapu'u and "The last of *Laupāhoehoe*." Kamehameha then retired to *Kauhola* at Hala'ula in Kohala with his counselors... [Kamakau, 1961:126]

To the above narratives, Desha (2000), writing between 1920 to 1924 elaborated on incidents during Kamehameha's quest to control the island of Hawai'i. Desha's narratives were based upon the writings of earlier historians and information he personally obtained from elder *kama'āina* in the lands described. Thus Desha, provides readers with more details of the events in *Laupāhoehoe* and vicinity. In the citations below, we find descriptions of resources which sustained the people on the land; of the movement of forces through the *Laupāhoehoe* forest lands and watershed; the names of various localities and chiefs of the region; and learn of a significant *heiau* at *Laupāhoehoe*, and the relationship of that *heiau* to establishment of Kamehameha's famed *Kānāwai Māmalahoe* (Law of the Splintered Paddle).

Desha's narratives also include specific descriptions of the ancient, upland trail between *Waimea* and *Laumai'a*, observing that it was used for the passage of warriors to the *Laupāhoehoe* battle field, with the party descending through the forest to the lowlands.

In these months when Kamehameha was staying at his birthplace and *Kekūhaupi'o* was at *Waimea*, Kamehameha received the news that his *ali'i*, whom he had stationed at *Laupāhoehoe* to watch that vicinity, had been wickedly slain. This *ali'i*, named *Lononuiākea*, was killed by *Pina'au* and his general, *Kauwehanehane*, who were chiefs on the side of *Keawemauhili*, the *ali'i nui* of Hilo... Because of this sad news which reached Kamehameha, he called his swift runner *Makoa*, one of the swift warriors of his court and said these words to him: "*E Makoa ē*, run to *Laupāhoehoe* and meet with the *ali'i* who are residing there and say to them that I [page 188] crave the *kihikihi* sweet potato, and also some of it mashed, and also some *nōpili* [goby fish] of the upland stream of *Laupāhoehoe*. You have heard. Run and tell them of my craving."

When *Makoa* heard his *haku* he assented: "*E ku'u lani ali'i* [my beloved chief], I hear your command and shall execute it without delay..."

...*Makoa* left *Kawaihae* for *Laupāhoehoe*, and in a short while he arrived before those *ali'i* stationed there by *Keawemauhili*. When they saw *Makoa* they called to him with those words customary to the *ali'i* of ancient times: "The word in the breast, tell it here."

Makoa told them of Kamehameha's craving for the mashed *kihikihi* sweet potato and the *lehua*-eating 'o'opu *nōpili* [goby fish] of the upland forest.

When Pīna'au heard these words by Makoa, his wrath rose and he replied angrily with these bitter words:

How exceedingly haughty! Am I Kamehameha's food steward that I should cater to his craving? You return to Kamehameha and say to him: "Right here in front is the 'o'opu fish, and also in his front is the sweet potato, therefore pile up those things [probably accompanied by vulgar gestures]."

When Makoa heard these insulting words about his *ali'i*, his anger rose and he said fearlessly without hesitation [page 189] "I have heard these words from your mouth, and I say to you, your mouth shall eat your foul words."

No sooner had Makoa spoken than Pīna'au sprang forward and seized Makoa in his hands, and at the same time Kauwehanehane sprang to seize Makoa's legs. Pīna'au said to his assistant: "Ea, reach for the cord and bind up this pig of ours."

Kauwehanehane released one hand from holding Makoa's left leg and reached for the cord.

Makoa raised up his free foot with great strength and struck Pīna'au in the Adam's apple (*kani'ā'i*), and Pīna'au fell with a broken neck and he died with his insulting words about Kamehameha. When Kauwehanehane saw this, he thought he would bind Makoa's legs, but with great strength Makoa aimed a kick at Kauwehanehane's eyes. He fell down, and Makoa took from his bosom his shark's tooth dagger (*leiomano*), and before Kauwehanehane could stand up, like a gust of the *Kiu* wind, he was struck dead on the mat. When Makoa emerged from the house, Keikei, one of the *ali'i* Pīna'au's warriors, leaped to take Makoa prisoner, but the *leiomano* did its deadly work and that warrior died. All of them became *moepu'u* for Kamehameha's slain *ali'i*. These people were killed by Makoa before anyone could realize what had happened to these sacrificial victims, and he began to run speedily to Kamehameha.

His *malo* fluttered at the *pali* of Hōkuli and his cloak waved as he ran on the plain of Waipunalei. His cloak fluttered in the wind of the *pali* and he leaped the *pali* of Keawali'i [Ka'awali'i], landing on the other side with great speed. A whoop going downhill (*kani ke o*), and he arrived on Kahoana, the place called "The War-Adze Sharpening Stone of Palila." Like the flutter of an eyelash he traversed the forest of Lupea, and with a whoop going downhill his *malo* fluttered above the *pali* of Maiu'u. Then Makoa increased his speed, and his cloak stood straight out behind with his *malo* fluttering, and he arrived before Kamehameha's house. However, there was no bundle in his hand.

Kamehameha observed his speedy messenger and said gently: "It is you, and you have indeed run here speedily." [page 190]

Makoa then reported on his journey to Laupāhoehoe, the insulting words of that *ali'i* Pīna'au concerning Kamehameha and their fight in which that *ali'i* and his two men were killed.

Kamehameha believed Makoa's words for he saw signs of the fight on his messenger whose hands were streaked with blood, and he still held the *leiomano*.

Because of the death of those *ali'i* of Laupāhoehoe and also the killing of that *ali'i* whom Kamehameha had stationed there, a fight began between Kamehameha and

Keawemauhili, high chief of Hilo. Kamehameha prepared for going to war again with the Hilo people. This war was known as “Laupāhoehoe Two.” The war canoes were readied on the sea and were led by Ke’eaumoku, the father of Ka’ahumanu, and were filled by skilled warriors who went by sea to the place where they were to meet the land forces.

The warriors on land were led by Kamehameha himself who had the army called Malana, numbering three *lau* or twelve hundred men by the counting of this time. The second army was under Nanuekaleiōpū, a famous warrior chief of Kamehameha’s time.

The name of his army was the Kīpu’upu’u. The reason for its being so called was that these were young people from Waimea who had been taught their skills in warfare by Kekūhaupi’o and who had also been taught to be speedy runners [like the gusting wind of Waimea]... [page 191] ...These two groups moved together until they arrived at a place called ‘*Umikoa*, where they divided. [page 195]

The army called Kīpu’upu’u, led by Nanuekaleiōpū, moved seaward of Koholālele, and the army called Malana under Kamehameha, took the straight way to *Laumai’a*, and from thence descended seaward at *Laupāhoehoe*. Before daybreak these armies arrived at the intended places. They had moved at night since Kamehameha did not want his enemies to see them moving to the place he desired to camp. This famous *ali’i* was very accomplished in battle strategy. At this place in our story, let us leave the Malana army under Kamehameha and move to the Kīpu’upu’u army under the leadership of High Chief Nu’uanuakalei’ōpu’u. On the morning of the next day, that army came out of the *lehua* forest and met the lookouts of Hāmākua at a place called Kaumaika’ohu. When these Hāmākua spies saw this army equipped with weapons, they ran seaward at Hāmākua and reported to the Hāmākua generals, who were Lohi’au, the *ali’i* of Kapulena, and Kaulainamoku, the *ali’i* of Kaumoali. When the news reached these *ali’i*, they were ready at the places where they had been stationed, each with their warriors who had been gathered together before they were needed. Word of the preparations made by the *ali’i nui* Kamehameha had been heard, and as these were chiefs of his land under the *ali’i nui* Keawemauhili of the Hilo districts, they had been ordered to be in readiness for the arrival of the enemy.

The Kīpu’upu’u army was divided into various sections, one of them being those trained in the use of the bow and arrow, led by a very skilled *ali’i* named Waheakalani of Kawaihaeuka. The warriors trained in the use of sling stones were led by Ha’awenui of Kohalaloko who was very skilled in this type of warfare. The division carrying the spears and stone battle-adzes were led by Nu’uanuakalani’ōpu’u as the general of this army. Kamehameha’s army under this high chief met the combined warriors of Hāmākua and Hilo. The combined armies of Hilo Palikū were led by Kalino, the chief of Honohina. The place this battle occurred was called Kaholo, a place at Hāmākua until this very day. The people called Kīpu’upu’u were young warriors chosen from the land of Waimea. They did not have experience from entering into numerous battles. The warriors in the combined forces of Hāmākua and Hilo had been seasoned in many battles (*he ma’a lākou i lena ka ’auwae*), and accustomed to whirling the various weapons of that ancient period of our ancestors. It was most appropriate to call this [page 196] combined army of Hāmākua and the Hilo districts “the yellow-backed crabs [swift, strong warriors] of the straight cliffs of Hāmākua and Hilo Palikū.”

At the meeting of these two armies, these young warriors of the Kīpu’upu’u rain of Waimea were not alarmed, and their genuine proficiency was seen in their handling of the various weapons held in their hands. The young bowmen were seen pulling on their *olonā* bow strings, and the young men accustomed to the sling showed their expertise. They had been trained for readiness by Kekūhaupi’o, Kamehameha’s famous warrior of

whom this story is told, and who is included in the story of the famous kingdom conqueror of the Pacific. The people holding the spears were seen following after the tracks of the people with the slings, attempting to meet the spear men of the enemy.

They had incomparable skill in whirling their spears. Also, the people with battle-adzes moved under the leadership of this *hoahānau* of Kamehameha who was one of the very able chiefs in warfare. Another thing well known in this battle was the great liveliness of those young Waimea warriors. Their speed in darting along the rows of cliffs was lively indeed on the many cliffs of Hāmākua, following after the tracks of the combined warriors of Hāmākua and Hilo. The battle, which started at a certain place called Hāmākua o Kupapaulau, lasted for two days and two nights. (Perhaps the *kama'āina* of this place are the ones who are familiar with it.)

After those two days of battle, it was understood that the warriors of the Kīpu'upu'u army were victorious, as the warriors of that side [Hilo-Hāmākua] began to run and hide in the Hāmākua forest. Also, some warriors hid in secret caves in the sea cliffs, and the Kīpu'upu'u warriors began to hunt them. Let us lay aside this Kīpu'upu'u army of Waimea for victory was achieved, and converse about those warriors under the leadership of Kalaninuimehameha.

He had divided his army and appointed their leaders. The bowmen under Kamehameha were led by a certain young *ali'i* named Kailio who was the own son of Keohuhu, the *ali'i* of Waimea, and Hākauwahine, his wife, who was the own daughter of Moana (w) and Heulu (k). He was a young chief accustomed to the use of weapons, and was trusted by his young warriors.

The warriors proficient with slings were under the leadership of Kamehameha's own warrior, named Kekuapāni'o, a very able general in the bodyguard [page 197] of Ali'i Kamehameha which was called Nā Koa Huelokū. This man had been a student of Kekūhaupi'o, the war instructor of the kingdom conqueror, and perhaps under Kekūhaupi'o's guidance, that very proficient chief had been appointed as leader of that division of the Malana army of Kamehameha. At a place called *Kapehu*, this army of warriors with slings under this brave man had first met the warriors of Keawemauhili, led by a certain chief of his land called Kainea. He was a warrior chief appointed by Keawemauhili as *ali'i 'ai 'okana 'āina* of that place. It was said that this was one of the very brave and able *ali'i* on the side of Keawemauhili.

In previous battles by Keawemauhili, the bravery of this chief Kainea was always seen, and he was recognized for his cleverness in battle strategy. Perhaps because of this he was stationed to watch the movements of Kamehameha's armies. This meeting of Kainea's men with those of Kamehameha resulted in a very hot battle. Kamehameha personally led his warriors who were so clever in whirling their battle-adzes and also in using their spears.

Battle of Laupāhoehoe Two

The genuine bravery of this *ali'i* Kainea had been shown in previous battles by Keawemauhili. Also, he was clever at planning war stratagems and, perhaps because of this, he had been stationed to spy out the movements of the men of Kamehameha's army. In this meeting between Kainea's warriors and those of Kamehameha's, a hot battle developed. Kamehameha personally led his warriors who were clever in the use of the battle-adzes (*ko'i pāhoa*) and also able in the use of spears... [page 198]

...During this terrible battle between the two sides, the battle shouts and wild calls of the men could be heard from Maulua to as far as Kealakekua [Kealakaha] at Hāmākua.

This terrible battle lasted for two days and two nights, and both sides held firm. On the third day the blows to Keawemauhili's forces began to show, and victory began to lean toward Kamehameha's forces. Then Keawemauhili's warriors began to leap over the sea cliffs. Some ran on the mountain paths seeking to escape and fulfilling that ancient saying: "Teach the warrior and also teach him to run."

On the third day of battle, Kuikahi, Keoho, and Nakaikua'ana were killed. They were *ali'i* who had to do with killing the *ali'i* whom Kamehameha had stationed at Laupāhoehoe. In other words, they had ordered it done.

We understand that the victory was achieved by the army led personally by Kamehameha, and also the Kīpu'upu'u army, led by Nu'uuanuakalani'ōpu'u. This was an honorable victory for the forces of Pai'ea Laninuimehameha.

This battle, called *Laupāhoehoe Two*, was one of the battles which brought Kamehameha fame for his skill. It caused a chill in the breasts of his enemies. Also seen in this battle was Kamehameha's great care for the lives of his men, and how he inspired them with his fearless words. At this battle, he also uttered those famous words which became a motto thereafter. He called his men his younger brothers, and at times he would say to Kekūhaupi'o, his bodyguard, that these men were their sons. This founded in his men a profound trust and love for him. This perhaps was the source of his victory over their hearts which brought hope for the future in the mind of the famous conqueror of Hawai'i Nui Kuauli.

After the victory in that Battle of Laupāhoehoe Two, Kamehameha stayed there, preparing himself to meet again with his opponents. The army led by [page 200] Nu'uuanuakalani'ōpu'u had joined Kamehameha there at Laupāhoehoe as his canoe fleet, under the leadership of Ke'eaumoku, also landed there. All the high chiefs of Kamehameha's court celebrated this victory over the first armies of Keawemauhili... [page 201]

...Kamehameha stayed in the beauty of *Laupāhoehoe*, farming, preparing himself for the great work before him, and training his warriors to be ready for battle. They were joined by some new warriors from the people of that place, who trusted in Kamehameha. At this same time some new warriors were gathered from Waimea to increase his forces. During this time at Laupāhoehoe, Kekūhaupi'o instructed these new warriors of his royal foster son. Also, a certain *heiau* at Laupāhoehoe was rebuilt. The thought grew in Kamehameha to seek on the shores of Puna a man [a sacrifice] for his *heiau*. [page 203]

He went to that place, and his head was struck with the canoe paddle. From this came his proclamation of the famous law of this kingdom conqueror: *Māmalahoa Ke Kānāwai* (Splintered Paddle Law)... [page 204] ...Kamehameha and his people stayed at Laupāhoehoe studying the profession of warfare, and also farming the land. It was always the custom for this *ali'i* Pai'ea to plant food or perhaps to fish. This is the foremost rule taught us from the life of this remarkable *ali'i*. Kekūhaupi'o was living with Kamehameha in those days, and his work was the instruction of the young warriors in the ancient martial arts...

...While Kamehameha was living at Laupāhoehoe he rebuilt and cleansed a certain *heiau* at that place,² and, when this was completed, he thought of sailing secretly to

² In his survey of *heiau* on Hawai'i Island in 1906, John Stokes discusses four *heiau* at Laupāhoehoe. Natives of the area told him that a place named Papa, then the location of the courthouse, was where Kamehameha declared his Māmalahoe Law (Stokes 1991:157). Stokes speculated that the courthouse may have been the former location of Papauleki'i *Heiau* which was listed by Thrum in 1906.

Puna to seek a man for the *heiau* he had just cleansed. It was always the custom that when *heiau* were cleansed and rebuilt, a man was sacrificed (*mōhai*) as a “pig” upon the *lele*... [Desha, 2000:205]

William Ellis and Party travel to Laupāhoehoe in 1823

In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (A.B.C.F.M.) toured the island of Hawai‘i seeking out primary communities in which to establish church centers for the growing Calvinist mission. The writings of Ellis and his companions (Ellis, 1963) offer readers a glimpse into the nature of communities, agricultural fields, and natural landscape around the island. When at Waiākea in Hilo, Ellis and his associates preached at the house of the “head man” of the locale. They also secured a double canoe for their passage to Laupāhoehoe.

In the narratives cited below, Ellis described the canoe trip to Laupāhoehoe, and then the travel of the party by foot about five miles inland to the village of Humu‘ula on the edge of the forest.

At daybreak on the 14th, after morning worship with the people who crowded our house, we made arrangements for our departure. Mr. Harwood remained, to return to Oahu in the brig *Inore*, lying at anchor in the bay, as he would thereby be enabled to transact some business for the mission, and also avoid travelling over the ravines of Hiro and Hamakua.

Soon after six a.m. we embarked on board our canoe, and passed over the reef to the deep water on the western side of the bay. The weather was calm, and the men laboured with their paddles till about eight, when the *maranai* (east wind) sprung up, and wafted us pleasantly along the shore. We found our double canoe very convenient, for it had a *pōra* (or stage) raised in the middle, which provided a comfortable seat, and also kept our packages above the spray of the sea... [page 242]

...The country, by which we sailed, was fertile, beautiful, and apparently populous. The numerous plantations on the eminences and sides of the deep ravines or valleys, by which it was intersected, with the streams meandering through them into the sea, presented altogether a most agreeable prospect. The coast was bold, and the rocks evidently volcanic. We frequently saw the water gushing out of hollows in the face of the rocks, or flowing in cascades from the top to the bottom.

After sailing pleasantly for several hours, we approached *Laupahoehoe*; we had proceeded upwards of twenty miles, and had passed not less than fifty ravines or valleys, but we had not seen a spot where we thought it would be possible to land without being swamped; and although we knew we had arrived at the end of our voyage, we could discover no place by which it seemed safe to approach the shore, as the surf was beating violently, and the wind blowing directly towards the land.

However, when we came within a few yards of the surf, we perceived an opening in the rocks, just wide enough to admit our canoe. Into this our pilots steered with uncommon address and precision; and before we could look round, we found our canoe on a sandy beach, a few yards long, entirely defended by rocks of lava from the rolling surf on the outside.

It was one p.m. when we landed, and walked up to the house of the head man, where we had a few fish and some potatoes, that we had brought with us, prepared for dinner. After the people of the place had been spoken to on the subject of religion, they said they had heard there were missionaries living at Oahu, teaching the king to read, and [page 244] write, and pray. They had also heard of Jehovah, but not of Jesus Christ. It was

compassionate in the great God, they added, to think of them, and send his word among them.

After remaining an hour or two, we proposed to proceed, but could not prevail on Makoa to go any further that night. He said we had come far enough for one day, and had better stay till the morning. He also complained of being tired with bailing out the canoe. We knew this was only an excuse, and that the principal reason why he wished to stop was because the head man of the place had invited us to remain, and had told us that if we would spend the night there, he would have a pig and some taro cooked. Makoa could not agree to lose the benefit of this offer; but as we were refreshed, and thought it best to proceed, we thanked the chief for his kindness, and, finding our guide determined to stay, we took each a blanket for a covering at night, and resumed our journey.

Leaving Laupahoehoe, we ascended the north side of the deep ravine, at the bottom of which the village is situated. We reached the top after climbing between 400 and 500 feet, and beheld a beautiful country before us. Over this we travelled about five miles in a W. N. W. direction towards the foot of Mouna-Kea, and after passing three deep ravines, reached Humuula shortly before sun-set.

This retired little village is situated on the edge of a wood, extending along the base of Mouna-Kea. We directed our steps to the principal house in the village, and invited the people of the neighbourhood to meet us there. They soon collected, and listened with apparent interest to a short discourse. Many continued with us till a late hour in conversation, which to them is usually a source of no small gratification... [Ellis, 1963:245]

Botanist, James Macrae and Party Travel to Mauna Kea Via Laupāhoehoe in 1825

In 1824, Liholiho (King Kamehameha II), his wife, Kamāmalu, and a group of retainers and foreign advisors, traveled from Hawai'i to England. Liholiho and his wife died there, and in May of 1825, their bodies were returned to Hawai'i by Lord Byron (Stewart, 1970:338). While preparing for the return voyage to England, Lord Byron had the H.M.S. Blonde port in Hilo Bay for refitting. Several individuals from the Blonde recorded important descriptions of localities visited on the island of Hawai'i as a result of the stop over. One of the crew members, being James Macrae, a botanist, penned detailed narratives of the journey from Hilo, along the coast to Laupāhoehoe, and from there up the mountain trail to the summit of Mauna Kea (Macrae, 1922). Through Macrae's writings, we are provided descriptions of the forests on the slopes of Mauna Kea; the native trail leading upland through Laupāhoehoe; bullock hunting being undertaken by natives and foreigners on Mauna Kea and the mountain lands; the first recording of the Mauna Kea Silver-sword; and that wild dogs were driving sheep to the summit region of the mountain.

The following narratives are excerpted from Macrae's longer narratives:

Arrives at Hilo. Prepares for Ascent of Mauna Kea.

June 12. Sunday. Strong E.N.E. breezes and cloudy. At 10 a.m., church service, the queens, chiefs and missionaries present. Shortened sail and came to anchor in 6 fathoms. I got Lord Byron to gain Queen Kaumanna's [Kaahumanu] consent for me to have 7 or 8 natives to accompany me to Mouna Kaah [Mauna Kea]. After her usual "hesitation to consider," she said I might have as many as I wanted. I also asked her for a hut on shore to which to remove my traps tomorrow, where Mr. Forder will live till I return and where he can dry what plants I may find necessary to send home while on my journey. She desired that I should be informed that she did not know of a hut, but when she went on shore she would enquire of the chiefs.

Rev. Mr. Goodrich, Missionary.

June 13. Went on shore to find the huts of the only two foreigners at this place, besides the missionaries, to procure one of these men as a guide to Mouna Kaah. I met Mr. Goodrich, one of the missionaries from Woahoo [Oahu], who told me that both of the persons of whom I was in search had left the place a fortnight ago, to kill wild cattle near Mouna Kaah, and would probably not return for some weeks. He said that rather than I should be disappointed, he would willingly accompany me. His kind offer I accepted.

It was thought best to go the first part of the journey by canoe, and to save 30 miles of travel over many deep ravines and large rivers. We might return by land if we wished. For this water plan we had again to apply, through Lord Byron, to Queen Kaumanna for a canoe and also extra natives to man it. This Lord Byron, in his usual pleasant manner, promised to do when he found her (Queen Kaumanna) in such humour as likely not to refuse him, she at present being rather sulky from accounts received of some persons on shore having acted wrongly in her absence.

Lord Byron gave Mr. Talbot, fourth lieutenant, and Mr. Wil- [page 45] son, purser, permission to accompany me on my journey, and also acquainted me that Queen Kaumanna had promised me the canoe and natives for the next day. At noon I went on shore to choose a suitable hut, and met Mr. Goodrich, who went with me to look at the huts round the bay, all pleasantly situated under the shade of breadfruit trees, which in places form woods by themselves, and grow to a great height, producing plenty of fruit, although they possess but little variety and are generally of the small kind...

...The whole of the E. side of Owhyee [Hawaii], which is divided into two districts, belongs to Kaumanna and Pio. When at Heddo [Hilo], their place of residence to receive the rents, is near the east side of the bay, and consists of no more than two huts, one of which is given to Lord Byron as a residence while here.

Returning on board, I heard that the canoe and natives would not be ready until tomorrow. Mr. Young this evening gave me some account of Mr. Menzies' journey to Mouna Roah,³ next highest to Mouna Keah to which I am going. During the 26 years that Mr. Young has been on the island, he has never seen Mouna Kaah [Keah] free from snow, but has not seen snow on Mouna Roah in summer, and on this he bases his theory of the greater height of Mouna Kaah. [page 46]

Start for Mauna Kea.

June 15. Fine day after a showery night during which the rain poured through the old tent. Mr. Goodrich arrived at daylight with the double canoe and natives, and we immediately began to embark our provisions, etc., for our journey. It was 6 o'clock, however, before we got alongside the ship, for Messrs. Talbot and Wilson, who were ready waiting for us. There were now 17 on board the canoe, eleven natives and six of ourselves. We started with the well wishes of all on board the Blonde for [page 47] our journey of 30 miles to **Lapaho**⁴ on the E. side of the island.

Favourable light east breezes, which freshened every hour until we landed in a narrow creek at 11 o'clock a.m. The creek was full of rocks, and open to a high surf that is

³ Archibald Menzies, a Scottish surgeon and naturalist, was the first white man to ascend to the top of Hualalai and the first white man and probably the first human being to reach the summit of Mauna Loa. For an account of his trips up these mountains, see "Hawaii Nei 128 Years ago," Honolulu 1920.

⁴ Laupahoehoe.

generally found on this coast, and which at all times, except early in the morning, makes landing very difficult and dangerous, as we ourselves experienced. We had the greatest difficulty to prevent our canoe from being dashed on shore, owing to the surf washing over us every minute and filling the canoe with water so fast as to render our efforts in baling it out useless. We got into dry clothes as far as possible and dried our firearms, and then found that the 40 lbs. of salt meat which I had for my share of the provisions was missing, but nothing else.

Laupahoehoe.

Lapahoi [Laupahoehoe] is a small stony flat with a few huts and sweet potatoes and taro patches scattered over it. It lies at the extremity of a deep ravine, the declivities on either side nearly 500 feet in height and extending to the sea beach, terminating in a rocky precipice. The coast all the way to *Lapahoi* was intersected by many deep ravines, many of which had large rivers forming beautiful waterfalls that fell over the outward cliffs into the ocean, the angry surf of which broke a long way up upon the rocks underneath.

On the upper part of the inclines a species of pandanus grew plentifully. It is commonly used by the natives for making mats for the floors of their huts. It forms thick plantations here, giving the coast a pleasant appearance with their green bushy tops hanging pendant over the rocks where underneath in many places small subterranean streams fall down at no great distance from each other. This species of pandanus is nowhere so plentiful in the Sandwich Islands as on the island of Owhyee. It is cultivated elsewhere frequently for its leaves for mats and pillows for the natives. The tea tree is also plentiful here in the valleys along the coast.

Climbing Mauna Kea.

By noon we had finished taking some refreshments and dividing our baggage into loads for the natives to carry. We [page 48] proceeded on our journey, leaving behind us six natives with orders to remain four days with the canoe in case we might return in that time and select to go home by water. The other five we took with us, making with ourselves eleven. On the summit above *Lapahoi*, we stopped to draw breath, and then every step became more interesting as we followed the narrow path to the woods above, which were yet four miles away. As we went along, the few native huts on either side were fast disappearing. The whole face of the country from the coast to six miles inland produced various fine prospects which reminded us of home, and if only cultivated, would produce an equal return of crops to any land of similar climate. But it is not even pastured by live stock, being covered with long grass and short stumpy tree ferns belonging to the *Cyathea* tribe, whose roots afford food for the swine about the huts of the natives.

These same huts are often inhabited by four generations, huddled together at night time like so many dumb animals, and often without sufficient shelter over them to protect them from the cold heavy dews that invariably fall here at night. We reached the outskirts of the woods between three and four in the afternoon, having on our way crossed three narrow deep ravines, thickly covered with wood, mostly *metrosideros*, *aleurites*, and a species of *rhus*, but without water except during heavy rains.

Our guide (Mr. Goodrich) recommended us to take up our quarters in these huts for the night, as these were the last inhabited ones on our way to the mountain where we had any chance to procure food to eat now and also to take with us, which on account of our loss on landing in the surf, we should now need.

When about to enter the largest of the huts to prospect its condition, Mr. Goodrich was accosted by a smiling young woman, the wife of one of those Europeans who had come to kill wild cattle. She informed us that she had only left the Europeans yesterday morning, and that they had shot two bullocks the day before. We went and took possession of the cleanest part of the hut for our accommodation, without leave, as is customary with these people themselves, while Mr. Goodrich went in search of a young pig or fowls. All that he could procure, in spite of offering money and looking glasses, were a couple of fowls, owing to the price put upon their pigs, being nearly triple their worth.

Mr. Wilson was found in the midst of a crowd of natives, highly amused and viewing them with surprise. I went to the [page 49] wood, while supper was being prepared, to look for plants, and found several species of ferns not seen before, and a few plants. I only got as far as the outskirts of the wood and the trees, which were of moderate size, consisted mostly of *metrosideros* and *aleurites*, with many ferns growing beneath their shade. In addition to the different species of *metrosideros* in variety of colours of the flowers as well as foliage already met with at Woahoo, there still appears in this island many which will add to their number, one particularly with straw-coloured flowers and white underneath the leaves, met with this evening, although sparingly, adds to my former collection.

When I got back, I found my three fellow travellers sitting on a mat, each holding a piece of fowl in one hand a clasp knife in the other, busy eating in the presence of a number of natives, some of whom had in their hands a light made from the kernels of the *kukui* or candle nut tree (*aleurites*) several nuts being passed through on a splinter of bamboo cane which gave a greater light than two or three common sized candles.

At 9 p.m. we retired to rest in a corner of the hut on a clean mat brought with us for the purpose, the rest of the hut being filled with the usual medley of men, women, children and dogs.

June 16. Fine but somewhat foggy. Got up at daylight, took the temperature of the air, which stood at 64. We were all ready to start at 5 a.m. in spite of the heavy dew which was still on the grass and bushes, and we were soon wet through by it up to our knees. We entered the wood about a mile from the edge of a small ravine, by a narrow path, where on either side grew a number of strong, healthy banana trees without cultivation and many of them having large bunches of fruit.

John Young and Isaac Davis's First Battle.

Mr. Goodrich informed us that it was at this ravine that Mr. Young and Mr. Davis had fought their first battle in the service of Tamahamaah [Kamehameha] and defeated upwards of 10,000 of the enemy with only 300 on their own side, before their leader came up to their assistance with the main body of the army. The description related to us of this engagement was that when King Tamahamaah had conquered the south side of Owhyee, he soon after, with his army, marched round to the opposite side of the island by the east, taking with him Young and Davis for the first time, [page 50] to whom he gave command of the chief part of his army. The chief of the Heddo part of the island was prepared to meet Tamahamaah in order to defend his proportion of the island from being subjected to the other's power, but on seeing the superior force of Tamahamaah, this chief kept retreating to the west till overtaken by Young and Davis, who were nearly a day's journey in advance of the main body of the army. The attack took place early in the afternoon from the opposite sides of the ravine in the wood, when after several hours engagement, it was decided in favor of Young and Davis, who alone had firearms. These two killed the enemy in vast numbers from the crowded manner in which they stood to oppose them, being unacquainted with the destructive effects of firearms.

This battle gave Tamahamaah the conquest of Owhyee.

We halted at 9 a.m. for refreshment, having travelled four miles through the wood, and I had the opportunity to ramble a little out of the path while the others rested. The trees now became more lofty, particularly a species of acacia used by the natives for canoes. Ferns of all kinds and sizes covered the ground beneath the trees, and a good many grew as parasites on the tree trunks. A noble species of Cyathea, equally numerous with the rest, often attained the height of 25 feet. Metrosideros with red bunchy flowering tops, covered with many red birds sucking their blossoms, were here much larger and taller than any seen on Woahoo. Besterias of various coloured flowers, and some of a climbing nature, and a numerous tribe of Psychotrias, both shrubby and succulent, as also many lobelias and other plants, aided by their variety to enliven our journey in spite of the many difficulties encountered from trees fallen across the path every other short distance, that had to be scrambled over. The path being slippery from the night rains occasioned many falls.

Wild Raspberries and Strawberries Plentiful.

After travelling another nine miles, we halted to fill our calabashes, this being the last place where we could obtain water till our return from Mouna Kaah. Here again, I took the temperature of the air. It had risen to 69. Towards the end of the wood the path became steeper. Here we found raspberries and strawberries of various kinds covered with fruit which we all ate eagerly to quench our thirst. The raspberries were very large and [page 51] flat at both ends, but round in the middle and not unpleasant in flavour. The strawberries were small and great quantities of fruit grew around us on every side and looked like a neglected garden.

Bullock Hunters.

We reached the end of the wood by 1 p.m., having travelled twelve miles, and above 12,000 feet above sea level. Here we found the two Europeans' temporary hut. They had been killing some of the wild cattle that had originally been introduced by Capt. Vancouver from the N.W. Coast of America and since suffered to remain unmolested for over 20 years. Since the death of King Tamahamaah the government has killed and salted many of the cattle for the supply of its small fleet. In the hut we found both the Europeans at home, asleep, and dressed in the costume of the country. There were also twenty natives, men, women and children outside, some asleep and others roasting pieces of flesh on a stick stuck in the ground slanting over the fire. Both the white men were well known to our guide, and being told of the object of our visit, offered to supply us with what beef we wanted. While the natives were cooking food for us we learned from these two half-naked foreigners, who could speak but little English, although one was a Welshman and the other a Prussian black-smith, and both for some time had been in the English navy, that they had succeeded in shooting several cattle, but with some difficulty, for the cattle often in droves of twenty were always sensible of any person approaching them. If unsuccessful in killing them with the first shot, it was absolutely necessary to have a place of retreat for their own safety, as they invariably pursued their destroyers with a kind of furious madness while they appear in sight.

Two days before, they had killed an old black bull, which they thought was one of the original number brought from California by Vancouver, from part of the right ear being cut off for a mark. They had been told that this had been put upon the cattle when landed thirty years ago. They have now increased to some hundreds, but it is curious that they have never been seen more than a few miles downwards in the wood from the mountain, and then only in warm weather for the sake of shade and water. Neither has a young one

ever been got hold of and [page 52] domesticated, although often attempted, for the mother living with her young, always seeks some retired place till the young ones are old enough to protect themselves.

I placed all the specimens I had collected since the commencement of our journey, in paper to be left till my return, and then went into the wood to look for more. Took the temperature of the air at 3 p.m., and found it was at 69, being the same as at 10 a.m. coming through the wood. Our guide told us we must travel at least 6 miles further towards the mountain to be able to gain the summit at an early hour tomorrow, before the horizon rose to prevent us from seeing the ship at anchor in the harbour. So waking my sleeping companions, we started on our next stage. However, a native unfortunately dropped a calabash of strong brandy and water (two gallons) being the last of my share of the spirits brought on the journey. We had scarcely travelled three miles when a thick fog commenced to roll in over the country which was covered with tufts of dry grass and full of cattle tracks. The soil was chiefly composed of sandy, pulverized lava, with numerous beds of strawberries growing on same. Raspberries grew in great abundance by the sides of the small ravines made by the torrents of water from the melted snow running here at certain seasons. They were of a better flavour than those in the upper part of the wood, being here more exposed to the sun.

By 6 p.m. we had travelled another two miles, when the fog became so thick that we were scarcely able to see ten yards ahead of us, and we were drenched and shivering with cold and almost beyond any vegetation to shelter us for the night. So we cut down boughs of *Acacia* and a species of *Sophora* and erected a hut. This we accomplished in little more than half an hour, and getting plenty of firewood kept a fire burning all night near where we lay. I rambled about till dark among cranberry bushes cutting specimens. The temperature at 7 p.m. was 52.

Too Cold for Natives.

Got up at 2 a.m., started at 3 and began our journey to the mountains leaving the natives behind, who feared the cold and did not want to accompany us. At 5 a.m., daylight began to appear and by then we had travelled three miles over sandy pulverized lava, sinking over our ankles at every step. [page 53]

The Silver Sword Plant.

The last mile was destitute of vegetation except one plant of the *Syginesia* tribe, in growth much like a *Yucca*, with sharp pointed sliver coloured leaves and green upright spike of three or four feet producing pendulous branches with brown flowers, truly superb, and almost worth the journey of coming here to see it on purpose.⁵ The majestic clouds rising on the horizon at day-break encircled us all round like an immense wall with towers of various forms and sizes on their tops. They lay at unequal distances along the horizon, gradually rising and changing into fresh shapes at every moment that had the finest effect imaginable... [Macrae, 1922:54]

Macrae continued his narrative of the Journey to the summit of Mauna Kea, and then again returned to the forest shores of Laupāhoehoe. Macrae also observed, that by 1825, sheep and wild dogs roamed the mountain lands, where he:

⁵ The Silver Sword plant of Hawaii was first brought to the knowledge of the botanical world by Dr. W.J. Hooker, who described it from specimens collected by David Douglas when he ascended Mauna Kea in 1834. See "David Douglas, Botanist at Hawaii," Honolulu 1919. Macrae climbed Mauna Kea in 1825, i.e., nine years ahead of Douglas, and must be credited with having been the first botanist to notice and collect the silver sword plant. Some modern writers persist in stating that the silver sword plant is found on Maui only. This is not the case, as it also grows on the high mountains of Hawaii.

...saw many skeletons of some kind of animal, devoid of all flesh, but apparently not long dead, and on rejoining our guide, was informed that the wild dogs had almost exterminated the sheep that Vancouver had brought with the cattle, pursuing them beyond the line of vegetation, where they became bewildered and died for want of food. [Macrae, 1922:56]

Of the journey *makai*—through the forest to the coastal lands of Laupāhoehoe, Macrae wrote:

Begins Return Journey.

It being now after 2 p.m., and still feeling unwell from the same causes as our guide, we left this interesting place and travelled slowly downwards, finding our few specimens of minerals, etc., almost twice their real weight. In this hobbling manner, scarcely able to drag our limbs for the last four miles, we reached our hut, where we found that the lad sent back in the morning to Messrs. Talbot and Wilson had not met them. So fearing they might have succumbed to the cold in their sleep, and knowing they had no provisions, we much repented having left them; but to our joy, in about half an hour, we heard them calling not far distant. When they came to the hut they did not appear so fatigued as we ourselves, in spite of the want of food. They had [page 56] slept for about an hour, then awoke and tried to follow us, but not finding any of our tracks, they gave up the idea of following us, and made for the first of the highest hills. The snow we had brought with us served us well with water, for the natives left behind had drunk all that we left of the latter article except about a pint. The natives rubbed our thighs and legs for us, a practice they often do for themselves in such circumstances. They call it *lummi lummi* [*lomilomi*]. The temperature at 7 p.m. was 50 and at 10 p.m. 48.

We calculated the summit of Mouna Kaah from Byron's (or Heddo) Bay to be about 70 miles by the common path, but in a direct line perhaps only half that distance. We judged the peak could not be under 18,000 feet above sea level.⁶ The land along the sea coast from Byron's Bay to upwards of 40 miles to the west and about 6 miles in breadth, was free from wood excepting by the sides and bottoms of the ravines. The forest that surrounds the central part of the island begins here, at the distance of 5 or 6 miles from the coast, and stretches back for a depth of 12 miles, intersected with deep valleys and large rivers of fine water. The outskirts of the forest nearest the sea are chiefly handsome coloured flowering species which entirely disappear after 5 or 6 miles towards the centre of the wood. The commonest species of *metrosideros* often attains a height of 40 feet and are thick in proportion. The wood is hard and durable.

The upper parts above the forest resemble pasture land for 7 miles farther, and are thinly covered with low growing shrubs and abundance of strawberries and raspberries. At a higher elevation, vegetation ceases for the last eight miles towards the summit. The clouds generally rise on the mountains of Owhyee and the other islands in the morning and disperse towards evening. Rain often falls at night and also in the daytime some distance from the peaks, while on the coast the sun may be shining and there is no appearance of rain.

June 18. Got up at daylight, being disturbed in the night by the howling of wild dogs which caused us to keep our fire burning. At six set out on our homeward way, and unknown to us, the natives at once set fire to our discarded hut, a common custom our guide told us. At 12 we had travelled 6 miles and reached the Prussian and Welshman's hut. These men had seen no wild cattle since we left them, the only animals observed having been [page 57] a wild dog and cat. The dog seemed to be the same kind as the

⁶ Mauna Kea is 13,825 feet high.

domesticated native one of which they eat the flesh, and the cat appeared like the European breed. After a breakfast of plenty of slices of roast beef and abundance of water, my companions spread their mats in the shade and slept till noon. I shifted my specimens that had been left here into dry papers, and gathered others, including strawberry and raspberry plants to take with me to England. At 2 the whole camp was on the move for *Lapahoi*, where we had left the canoe and the natives. On reaching the first hut, we found only the two foreigners, the rest having gone on to *Lapahoi*. They promised to have a fire ready for us to dry our clothes at, but although I gave them each a dollar on starting they had nothing ready for us and did not get us any food till 9 p.m.

Natives Object to Sunday Travel.

June 19. Hazy, light showers. Sunday, and on that account the natives refused to accompany me to join the other part of my party with their loads, and said, the missionaries had ordered them not to.

Game of Noa

The blacksmith, however, promised to accompany me with his own people at 11 a.m., but instead of doing so, went and played and gambled at Nooah. This game is one of their most ancient and frequently played pastimes. It consists in placing in a row, five small *tapa* bags stuffed with cotton or the down of ferns, underneath one of which is hidden a stone so as to deceive the parties playing which of the bags it was put under.

The players are seated around in a circle, each armed with a small wand in his hand with which he strikes the bag he supposes the stone to be under. There are generally ten players with different coloured rags tied to their wands. I have been told that at this game they gamble their hogs and all their possessions, even their wives, and are very strict in paying their debts of honor.

Leaving them gambling, I left with the two lads and two natives for *Lapahoi*, and joined my party there about 3 p.m. They were just about to start for home, having expected me in the morning. The canoe had not waited for us as ordered but had returned home the second day after we started for the mountain. We therefore had to go home by land, and took up our [page 58] quarters for the night about 7 p.m. after having crossed a number of deep ravines, wading through rivers, at times up to our middle... [page 59]

...We arrived opposite the ship at 5 p.m. very tired from our many climbs up and down, since we left *Lapahoi* on Sunday, distant 40 miles... [Macrae, 1922:60]

Gerrit P. Judd's Account of Travel Around Mauna Kea and the Upper Reaches of the Laupāhoehoe Forest in 1830

Gerrit P. Judd, was a doctor attached to the Sandwich Island Mission Station, at Honolulu. Because of his medical expertise, he was frequently in the company of the *ali'i* and made tours around the islands. In June and July of 1830, while on a visit to Waimea, Judd and native guides traveled across the mountain lands. In his letter to the Mission Board in Boston, were found narratives describing his journey along the Hāmākua-Laupāhoehoe trail, skirting the upper forest lands, while on his way to Hilo Bay.

Honolulu, August 19th, 1830
Gerrit P. Judd;
to Jeremiah Evarts, Esqr.
Missionary Rooms, Handover St., Boston:

[July] 3rd. Returned from my visit [to Kilauea]. I left home early on the morning of the 24th travelling towards the eastern side of Mauna Kea, my route the two first days was through thick woods frequented only by sandalwood cutters & wild cattle until I arrived at *Laupāhoehoe*. I then proceeded along the sea shore to Hilo a distance of about 20 miles. The country here is extremely fertile, but rather unpleasant, on account of the almost incessant rains, that it is well watered you will believe when I tell you that I crossed more than 50 streams with banks from one to five hundred feet high on each side. I was forced to ford many that were 2 or 3 feet in depth at the most shallow part that could be found. In one instance was ferried across in a canoe... [page 9]

[July 31; departing from Kilauea] Parted with Mr. & Mrs. Andrews about noon on Thursday in order to return to Waimea by a direct rout over the unfrequented country between Mauna Roa & Mauna Kea. I found this journey excessively fatiguing. We travelled over rough lava without a path sleeping on the ground & in the huts of sandal wood cutters, without much food or water. The south & western sides of Mauna Kea are altogether unlike *the North & East*. The former dry and barren, the latter *rich with wooded & susceptible of cultivation one third of the distance upwards...* [page 10; A.B.C.F.M. Collection, Houghton Library, Harvard]

David Douglas on the Mountain Lands of Laupāhoehoe and Vicinity in 1834

In January 1834, naturalist David Douglas visited the island of Hawai'i, traveled around the base of Mauna Kea—including the upper Laupāhoehoe forest zone—and ascended Mauna Kea. The records of the trip kept by Douglas (published in the *Hawaiian Spectator* of 1839) provide us with detailed descriptions of the journey from Hilo Bay to the mountain, with discussions on the natural environment, make up of the forests, and changes in the landscape as the elevation was increased. A number of plants collected by Douglas, were subsequently named for him, though his place in history on the mountain lands is more readily remembered by the fact that he died at a location near the *mauka* (upland) boundary of Laupāhoehoe, with Humu'ula, while on his second visit to the island.

While walking the old mountain trail, skirting the forest zone between Humu'ula and the Laupāhoehoe-Waipunalei boundary, Douglas apparently fell into a dug-out trap meant to catch wild bullocks, and was killed by an animal trapped there. The location of this accident was at a place named Keahua-ai, and is in the vicinity of the place known today as “Kaluakauka,” The Doctor's Pit, or Douglas Pit (see Register Map No. 667).

Douglas wrote the following account of his first trip to Mauna Kea, and provides readers with references to the lands of the Hilo Forest Reserve, of which Laupāhoehoe was originally a part. Douglas also noted that a sawmill was situated on the mountain lands, this being near the upper reaches of the forest region with the boundary of Humu'ula:

...On Tuesday, the 31st of December, we stood in for the island of Hawaii, and saw Mauna Kea very clearly, a few small stripes of snow lying only near its summit, which would seem to indicate an altitude inferior to that which has been commonly assigned to this mountain.

My object being to ascend and explore Mauna Kea, as soon as possible, I started on the 7th January, 1834, and, after passing for rather more than three miles over plain country, commenced the ascent, which was however gradually entering the wood. Here the scenery was truly beautiful. *Large timber trees were covered with creepers and species of Tillandsia, while [page 399] the Tree Ferns gave a peculiar character to the whole country. We halted and dined at the saw-mill,* and made some barometrical observations, of which the result is recorded, along with those that occupied my time daily during the voyage, in my Journal.

Above this spot the Banana no longer grows, but I observed a species of *Rubus* among the rocks. We continued our way under such heavy rain, as with the already bad state of the path, rendered walking very difficult and laborious; in the chinks of the lava, the mud was so wet that we repeatedly sank in it, above our knees.

Encamping at some small huts, we passed, an uncomfortable night, as no dry wood could be obtained for fuel, and it continued to rain without intermission. The next day we proceeded on our way at eight o'clock, the path becoming worse and worse.

The large Tree Ferns, and other trees that shadowed it, proved no protection from the incessant rain, and I was drenched to the skin the whole day, besides repeatedly slipping into deep holes full of soft mud. The number of species of *Filices* is very great, and toward the upper end of the wood, the timber trees, sixty or seventy feet high, and three to ten inches in circumference, are matted with Mosses, which together with the *Tillandsias* and Ferns, betoken an exceedingly humid atmosphere. The wood terminates abruptly; but as the lodge of the cattle hunter was still about a mile and a half farther up the clear flank of the mountain, situated on the bank of a craggy lava stream, I delayed ascertaining the exact altitude of the spot where the woody region ends, (a point of no small interest to the Botanist) until my return, and sat down to rest myself awhile, in a place where the ground was thickly carpeted with species of *Fragaria* [*ōhelo papa*] some of which were in blossom, and a few of them in fruit. Here a Mr. Miles, part owner of the saw-mill that I had passed the day before, came up to me; he was on his way to join his partner, a Mr. Castle, who was engaged in curing the flesh of the wild cattle near the verge of the wood, and his conversation helped to beguile the fatigues of the road, for though the distance I had accomplished this morning was little more than [page 400] seven miles, still the laborious nature of the path, and the weight of more than 60 lbs. on my back, where I carried my barometer, thermometer, book and papers, proved so very fatiguing, that I felt myself almost worn out. I reached the lodge at four, wet to the skin, and benumbed with cold, and humble as the shelter was, I hailed it with delight. Here a large fire dried my clothes, and I got something to eat, though, unluckily, my guides all lingered behind, and those who carried my blanket and tea kettle were the last to make their appearance. These people have no thought or consideration for the morrow; but sit down to their food, smoke and tell stories, and make themselves perfectly happy.

The next day my two new acquaintances went out with their guns and shot a young bull, a few rods from the hut, which they kindly gave me for the use of my party. According to report, the grassy flanks of the mountain abound with wild cattle, the offspring of the stock left here by Capt. Vancouver, and which now prove a very great benefit to this island. A slight interval of better weather this afternoon afforded a glimpse of the summit between the clouds, it was covered with snow. At night the sky became quite clear, and the stars, among which I observed Orion, Canis minor, and Canopus, shone with intense brilliancy.

The next day the atmosphere was perfectly cloudless, and I visited some of the high peaks which were thinly patched with snow. On two of them which were extinct

volcanoes, not a blade of grass could be seen, nor anything save lava, mostly reddish, but in some places of a black color. Though on the summit of the most elevated peak, the thermometer under a bright sun, stood at 40°, yet when the instrument was laid at an angle of about fifteen degrees, the quicksilver rose to 63°, and the blocks of lava felt sensibly warm to the touch. The wind was from all directions, east and west, for the great altitude and the extensive mass of heating matter completely destroyed the Trade wind. The last plant that I saw upon the mountain was a gigantic species of the Compositae (*Argyrophyton Douglasii*, Hook. Ic. Plant. t. 75.) [*hinahina*, '*āhinahina*] with a column of imbricated sharp pointed leaves, densely [page 401] covered with a silky clothing. I gathered a few seeds of the plants which I met with, among them a remarkable *Ranunculus*, which grows as high up as there is any soil...

The line of what may be called the Woody Country, the upper verge of which the barometer expresses 21, 450 inch.; therm. 46°, at 2 P.M., is where we immediately enter on a region of broken and uneven ground with here and there lumps of lava, rising above the general declivity to a height of three hundred to four hundred feet, intersected by deep chasms, which [page 402] show the course of the lava when in a state of fluidity. This portion of the mountain is highly picturesque and sublime. Three kinds of timber of small growth, are scattered, over the low knolls, with one species of *Rubus* and *Vaccinium*, the genus *Fragaria* and a few *Gramineae Filices* and some alpine species. This region extends to bar. 20,260 inch.; air 40°, dew point 30°. There is a third region, which reaches to the place where we encamped yesterday, and seems to be the great rise or spring of the lava, the upper part of which, at the foot of the first extinct peak is bar. 20,010 inch., air 39°... [Douglas in Hawaiian Spectator, 1839:403]

On January 15th, 1834, Douglas and his small party began their return from the summit region of Mauna Kea to the forest lands of Hilo. In the following narratives, Douglas mentions numerous plants of the forest region, including those of the understory:

...15th [January], I packed up all the baggage and prepared to return. It consisted of several bundles of plants, put into paper and large packages tied up in *Koa* baskets, which are manufactured from a large and beautiful tree, a species of *Acacia*, of which the timber resembles mahogany, though of a lighter color, and is beautiful, and said to be durable: also some parcels of geological specimens, my instruments, etc. At seven A.M. I started, having sent the bearers of my luggage before me, but I had hardly entered the wood by the same path, as I took on my ascent, when the rain began to fall, which continued the whole day without the least intermission; but as there was no place suitable for encamping, and the people, as usual, had straggled away from one another, I resolved to proceed. The path was in a dreadful state, numerous rivulets overflowed it in many places, and rising above their banks, flashed in foam through the deep glens, the necessity for crossing which impeded my progress in no slight degree. In the low places the water spread into small lakes, and where the road had a considerable declivity, the rushing torrent which flowed down it, gave rather the appearance of a cascade than a path. The road was so soft that we repeatedly sank to the knees and supported ourselves on a lava block, or the roots of the trees. Still, violent as was the rain, and slippery and dangerous the path, I gathered a truly splendid collection of Ferns, of nearly fifty species, with a few other plants, and some seeds, which were tied up in small bundles, to prevent fermentation, and these protected by fresh *Koa* bark. Several beautiful specimens of Mosses and Lichens were also collected; and in spite of all the disadvantages and fatigues that I underwent, still the magnificence of the scenery commanded my frequent attention, and I repeatedly sat down in the course of the day under some huge spreading Tree Fern, which more resembled an individual of the Pine than the Fern tribe, and contemplated with delight the endless variety of form and

structure that [page 406] adorned the objects around me. On the higher part of the mountain, I gathered a Fern identical with the *Asplenium viride* of my own native country, a circumstance which gave me inexpressible pleasure, and recalled to my mind many of the happiest scenes of my early life.

In the evening I reached the saw-mill, when the kind welcome of my mountain friend, Mr. Miles, together with a rousing fire, soon made me forget the rain and fatigues of the day. Some of the men had arrived before me, others afterwards, and two did not appear till the following day; for having met with some friends, loaded with meat, they preferred a good supper to a dry bed. My guide, friend, and well disposed fellow, arrived in great dismay, having in the dark, entered the river a short distance above a chain of cataracts, and to avoid these, he had clung to a rock till extricated by the aid of two active young men. Though he escaped unhurt, he had been exposed to the wet for nearly ten hours. A night of constant rain succeeded, but I rested well, and after breakfast having examined all the packages, we quitted the sawmill for the bay, and arrived there in the afternoon, the arrangement and preservation of my plants affording me occupation for two or three days. It was no easy matter to dry specimens and paper during such incessantly rainy weather. I paid the whole of the sixteen men who had accompanied me, not including Honori and the king's man, at the rate of two dollars, some in money, and some in goods; the latter consisted of cotton cloth combs, scissors and thread, etc.; while to those who had acquitted themselves with willingness and activity, I added a small present in addition. Most of them preferred money, especially the lazy fellows. The whole of the number employed in carrying my baggage and provisions, was five men, which left eleven for the conveyance of their own tapas and food. Nor was this unreasonable for the quantity of food which a native will consume in a week, nearly equals his own weight! A dreadful drawback on expedition. Still though the sixteen persons ate two bullocks in a week, besides what they carried, a [page 407] threatened scarcity of food compelled me to return rather sooner than I should have done, in order that the calabashes might be replenished. No people the world can cram themselves to such a degree as the Sandwich Islanders; their food is however, of a very light kind, and easy of digestion... [Douglas in Hawaiian Spectator, 1839:408]

Having completed his trek to both Mauna Kea and Mauna Loa, Douglas also visited Kilauea and then returned to O'ahu. In July of 1834, Douglas returned to Hawai'i for a second trip to Mauna Kea. This trip was made via the Waimea-Laumai'a mountain trail, and was the last trip he made. Circumstances around his last days and death, were written up by reverends Joseph Goodrich and John Diell, published in the Missionary newspaper, *Ke Kumu Hawaii* on November 26, 1834:

Death of Mr. Douglas.

The following letter has been kindly furnished for publication. It may be proper to remark that Mr. David Douglas, whose untimely and tragical death his friends and the community sincerely deplore, was born at Perth, Scotland, and had travelled in various parts of the world as a naturalist connected with the Horticultural Society of London. It is supposed his age was about 40 years.

The body was examined at Honolulu, Aug. 3, by a number of medical gentlemen, and from the marks found on it, they were unanimous in the opinion that his death was accidental.

Hilo, Hawaii, July 15, 1834.

To Richard Charlton, Esq., his Britannic Majesty's Consul at the Sandwich Islands;

Dear Sir,—Our hearts almost fail within us, as we undertake to perform the melancholy duty which devolves upon us to communicate the painful intelligence of the death of our friend Mr. Douglas, and such particulars thus far, as we have been able to gather...

...As Mr. Diell was standing in the door of Mr. Goodrich's house yesterday morning, about 8 o'clock, a native came up, and with an expression of countenance, which indicated but too faithfully that he was the bearer of sad tidings, inquired for Mr. Goodrich; in seeing him, he communicated the dreadful intelligence that the body of Mr. Douglas had been found on the mountains, in a pit excavated for the purpose of taking wild cattle, and that he was supposed to have been killed by the bullock which was in the pit when Mr. Douglas fell in. Never were our feelings so shocked, nor could we credit the report till it was painfully confirmed as we proceeded to the beach, whither his body had been conveyed in a canoe by the native who informed us of his death. As we walked down with the native, and made further inquiries of him, he gave, for substance, the following relation.

That on the evening of the 13th inst. the natives who brought the body down from the mountain, came to his house at *Laupahoihoi*, about twenty-five or thirty miles distant from Hilo, and employed him to bring it to this place in his canoe. The particulars which he learned from them, were as follows:

That Mr. Douglas left Kohala point last week, in company with a foreigner (an Englishman) as a guide, and proceeded to cross Mauna Kea on the north side; that on the 12th inst. he dismissed his guide, who cautioned him, on parting, to be very careful lest he should fall into some of the pits excavated for the purpose mentioned above; describing their location as being near the places to which the cattle resorted to drink. That soon after Mr. Douglas had dismissed his guide, he went back a short distance to get a bundle which he had forgotten, and that as he was retracing his steps, at some fatal moment he fell into one of the pits, into which a bullock had previously fallen. That he was found dead in the pit by those same natives, who, ignorant at the time, of his passing, were in pursuit of bullocks, and on coming up to this pit, found a small hole in one end of the covering of it. At first they conjectured that a calf had fallen in, but on further examination, discovered traces of a man's steps, and soon afterwards saw his feet in the pit, the rest of his body being covered with dirt and rubbish. They went immediately in pursuit of the guide, who returned, shot the bullock in the pit, took out the body, and hired the natives at the price of four bullocks, which he killed immediately, to convey the body to the sea shore. He himself accompanied them and procured the native who related the affair to us, to bring the body to this place, promising to come on himself immediately, and that he would bring the compass, watch, which was somewhat broken but still going, some money found in Mr. Douglas's pockets, and the little dog, that faithful companion of our departed friend. Thus for the report of the natives who brought the body in his canoe, and who professed to relate the facts to us as he learned them from the natives who came down from the mountain. We do not stop, at present, to examine how far it is consistent or inconsistent with itself, as we have not the means of making full investigation into the matter...

16th. As neither the guides nor any other natives have arrived, we have employed two foreigners to proceed to the place where with directions to find the natives who discovered the body, and to go with them to the pit, and after making as full inquiries as possible, to report to us immediately...

...3 o'clock, P.M. Edward Gurney, the Englishman spoken of before, has arrived. Our minds are greatly relieved as to the probable way in which the fatal event was brought about.

He states, that on the 12th inst. about ten minutes before six o'clock in the morning, Mr. Douglas arrived at his house on the mountain, and wished him to point out the road to Hilo, and to go a short distance with him. Mr. Douglas was then alone, but said that his man had given out the day before; (this man was probably John, Mr. Diell's colored man.) After taking breakfast, Edward accompanied Mr. Douglas about three fourths of a mile, and after directing him in the path, and warning him of the traps, went on about half a mile further with him. Mr. Douglas then dismissed him, after expressing an anxious wish to reach Hilo by evening, thinking that he could find out the way himself.

Just before Edward left him, he warned him particularly of the three bullock traps, about two miles and a half ahead; two of them directly on the road, the other on one side.

Edward then parted with Mr. Douglas, and went back to skin some bullocks which he had previously killed. About 11 o'clock, two natives came in pursuit of him, and said that the European was dead, and that they had found him in the pit in which the bullock was. They mentioned that as they were coming up to this pit, one of them observing some of the clothing on the side exclaimed Lole, but in a moment afterwards, discovered Mr. Douglas within the cave trampled under the feet of the bullock. They went back immediately for Edward, who left his work, ran to the house for a musket and ball, and hide, and on coming up to the pit found the bullock standing upon Mr. Douglas's body. Mr. Douglas was lying upon his right side. He shot the animal, and after drawing him to the other end of the pit, succeeded in getting out the body. His cane was with him, but the bundle and dog were not. Edward, knowing that he had a bundle, asked for it. After a few moment's search, the dog was heard to bark, at a short distance ahead, on the road leading to Hilo. On coming up to the place, he found the dog and the bundle. On further examination it appeared that Mr. Douglas had stopped for a moment and looked at the empty pit, and also at the one in which the cow had been taken, that after passing on up the hill some fifteen fathoms; he laid down his bundle and went back to the pit in which the bullock was entrapped, and which lay on the side of the pond opposite to that along which the road runs, and that whilst looking in, by making a mis-step, or by some other fatal means, he fell into the power of the infuriated animal, who speedily executed the work of death.

The body was covered in part with stones, and probably this circumstance prevented his being entirely crushed. After removing the body, Edward took charge of the dog and bundle, and also of his watch and chronometer, (which is injured in some way,) his pocket compass, keys, and money which was in his pockets; and after hiring the natives to carry the body to the shore, (a distance of about 27 miles,) came on in company with them, and then came directly to this place.

This narrative clears up many of the difficulties which rested upon the whole matter, and perhaps it will afford a pretty satisfactory account of the matter in which Mr. Douglas met with his awful death...

Your friends and obedient servants,

Joseph Goodrich.
John Diell.

Note. The black man mentioned in the letter probably lost his way and perished in the mountains, as he has not been heard of since. [*Ke Kumu Hawaii*, November 26, 1834:15]

Journey from Laupāhoehoe to Ned Gurney's Residence at Lahohinu in 1838

A short account penned by a writer to the native language newspaper, *Ke Kumu Hawaii* in 1838 (October 10, 1838:37), references a trip to Laupāhoehoe by canoe, and then travel via the trail to the uplands at Lahohinu. Lahohinu was the home of Ned Gurney, situated just out of the Laupāhoehoe-Waipunalei forest lands. The writer described the trip in the following narratives:

Auheā oe e ke Kumu Hawaii,

*He mea pono paha ia'u e hoakaka aku ia oe i kuu holo ana i Hawaii me kuu mau ohua...
...A ma ka po o ka la 16 o Iulai oia ka noa, holo ma ka waa i Laupāhoehoe; a kakahiaka
pae makou. Halawai me na kanaka, alaila holo aku ma ke ala mauka i Waimea. Po iho,
moe makou ma kahi o Nede, ma kahi anu, no ka mea ua kiekie, aneane like a like mai ke
kai a hala iluna loa o Mauna Kea. Puka mai ka la, a mehana ae la, holo mau a makou i
Waimea a aui ae ka la puka aku malaila. Nui loa ka lepo ma ke alanui mai kahi o Nede a
hiki i Waimea. Aole nui ka ua malaila; aia ka ua ma ka aina malalo, aole nui ma kahi
kiekie e like me ko Nede wahi...*

Hail to you *Kumu Hawaii*,

It is perhaps appropriate for me to tell you about the trip my companions and I made to Hawaii... On the night of the 16th day of July, when free, we went by canoe to Laupāhoehoe; landing in the morning. We met with the people there, and then went via the upland trail to Waimea. That night, we slept at the place of Ned [Gurney], it is a cold place, because of the elevation. It is almost as far from the ocean as from the top of Mauna Kea. When the sun rose it was warm, and we went to Waimea, the sun was setting when we arrived. There was a lot of dust along the trail from Ned's place to Waimea. There isn't a lot of rain there. The rain is on the lower lands, without a much at the higher elevations as at Ned's place... [Maly, translator]

Travel through the Hilo Forest Lands and Ascent of Mauna Kea in 1840

In 1840-1841, Charles Wilkes, Commander of the United States Exploring Expedition, traveled around the islands documenting various aspects of the natural and cultural landscape of Hawai'i. In 1841, members of Wilkes' party traveled to the summits of both Mauna Loa and Mauna Kea. The narratives below (Wilkes, 1844, reprint of 1970), describe the approach to Mauna Kea via the trail from Hilo, passing through Pi'ihonua, to the upper reaches of the Wailuku River; across Humu'ula, and on to the summit of the mountain—the narratives also describe the region around the upper Laupāhoehoe forests, on the shared boundary with Humu'ula, and descriptions of the bullock pit in which David Douglas met his end.

Wilkes' narratives also include observations made by the traveling party of the nature of the forest at various elevations; native practices associated with bird catching on the mountain lands; the danger presented by wild cattle on the mountain lands; the residence of cattle hunters in the Humu'ula-Keanakolu vicinity mountain lands—above Laupāhoehoe; and the sawmill of James Castle, formerly situated at Kapahukea in the Pi'ihonua forest, near the boundary with Humu'ula:

...During the time of our residence on Mauna Loa, Dr. Pickering and Mr. Brackenridge volunteered to make the ascent of Mauna Kea. They were furnished with guides, among them Sandwich Jack, our bullock-driver, whose true name I believe was Dawson, though

he went by the sobriquet of Billy Lilly. They set out on the 8th of January, attended by natives from Hilo, belonging to Kanuha, having agreed to pay each of them fifty cents a day. Their first stage was to the sawmill erected on the Wailuku, distant about seven miles from Hilo, and three miles within the verge of the forest; here they stopped for the night with a man by the name of Simons, who is the occupant of the mill, which belongs to a Mr. Castle. The mill, as I understand, had proved but a bad speculation; it is now out of repair, and there is not sufficient demand for boards to make it at all profitable...

...On the 10th of January they resumed their journey, and followed the "Long Road" for about two miles, which is the whole distance to which it extends; the removal of the chief who was engaged on it had put a stop to its further progress. They were now fairly in the forest, [page 199] which was thought by our gentlemen to be a fine one; it consisted altogether of two kinds of trees, the *ohea* (*Callistemon*), and *koa* (*Acacia*); they also met with several species of the tree-fern, which seem to vie with each other in beauty. Many of these were of genera and species that had not before been met with, one of which afforded the silky down before spoken of, and another, the edible fern, a drawing of which will be seen at the end of this chapter. On reaching the bed of the stream, which is one of the routes through the wood, the guides led them upon it. *As they proceeded, they overtook one of the boys who had preceded them, endeavoring to catch a large bird. He had armed with bird-lime one of the pendent branches of a small ohea tree that overhung the stream and was in full flower. As they were passing, the bird was seen hovering about, while the boy was slyly watching its movements. When they had passed it a short distance they heard the scream of the captured bird, but by some mishap it afterwards escaped.*

Their encampment was under an ohea tree, where the natives built a hut for them with boughs and the fronds of ferns. From the prevalence of heavy rain they found all the wood wet, and could not succeed in making a fire: they consequently passed a miserable night; for in almost any climate, when encamped in the open air at night, a fire seems to be necessary for comfort, particularly when the weather is wet... Their guide, Dawson, during the morning showed much alarm at their starting some young cattle, lest the old cows should be near, who he thought might be troublesome; the cattle, however, were discovered afterwards to be tame. At the forks of the stream they took the left branch, and after a walk of two miles, came to some huts occupied by natives who had been bullock-hunting. In this illegal practice they seem to have been extensively engaged, judging from the quantities of jerked meat they had on hand.

The cattle have been tabooed for five years, from the year 1840, in consequence of the slaughter that had been made among them. Upwards of five thousand hides, I was told, had been procured in a single year, and when this became known to the government, it interdicted the hunting of the animal. I heard no estimate of the number of the wild cattle, but they are believed to be very considerable, and all from the stock left by Vancouver in 1795.

From these natives they procured some jerked beef, and were told [page 200] that ice had formed there the night before. The effects of frost on the foliage was evident, and yet the elevation did not exceed five thousand feet.

They encamped at night in an open space in the woods, near *some shallow pools called the Duck-Ponds [Wai-koloa]*, from the quantity of these birds frequenting them. The ground was chiefly covered with tufts of a small *Carex*. The trees now began to appear gnarled and covered with moss, resembling oaks in habit. The ground had become much drier, and the brushwood was gradually disappearing.

On the 12th, they started at sunrise, and by eleven o'clock found they had cleared the forest. Their altitude was about six thousand feet. The woods had become for some time previously much scattered. They passed also a distinct lava stream, of no great size. The ground was frozen, and the pools of water were covered with a thin ice.

This upper part of the forest afforded a greater variety of trees, though of smaller dimensions: here they met with the false sandalwood (*Myoporum*); the *koa* was, however, still the principal tree... [page 201]

The Wilkes party made the trip to the summit of Mauna Kea, and then returned to the upper reaches of the forests, where they visited Keahua'ai, the pit into which Douglas had fallen. Somewhere in the vicinity of Keahua'ai, the party then cut through the forest—most likely traveling through lands of the present-day Laupāhoehoe-Welokā Forest Reserve—traveling *makai*, to the land of Pu'u'ōhai, which bounds Maulua, on the south. Wilkes included descriptions of the bullock pits, the danger of bullocks in the region, and the forest lands in his narratives:

...On the 15th, they concluded to descend, after making a tour on this same level, where they found the ground as barren as on the route by which they had ascended. Small herds of cattle were seen, but at a great distance apart; these have now become shy, from having been hunted by Spaniards with horses from California, which were imported for the express purpose of carrying on systematically the business of killing the cattle for their hides. These hunters would soon have exterminated them. [page 203]

The golden plover is very abundant on the plain, as every where else; but is said to quit the islands in the breeding season. No geese were seen on this mountain; but many small birds appeared as high up as the *mamane* trees. They also saw hawks, which, by a perversion of language, are called "crows."⁷

They then went towards "Ned's House" (now deserted) [the original Keanakolu vicinity, not where the present-day forestry cabin is situated], and took the path leading in a southeast direction, along the margin of the woods. This was the route that Douglass followed, when he left Ned's House, on the morning of his death. In about three quarters of an hour, they arrived at the pits; in one of which he was found dead. They are situated in an open clearing, in the centre of which is a low marshy spot, sometimes containing water, which the cattle come in search of. The annexed diagram [Figure 3] will give an idea of the locality. These pits are covered with raspberry and other fragile bushes; which are covered again with soil, and the hoofs of cattle imprinted on them, to deceive.

There were many circumstances attendant upon the death of Douglass, leading to the suspicion that he had been murdered by Ned, at whose house he had breakfasted. The general character of Ned gave rise to a feeling that such was the fact, he having been a runaway convict from New South Wales. It seems somewhat singular that Mr. Douglass should have laid down his bundle and returned after passing the pits; and it is remarkable too that his servant, who had parted from him the same morning, should also have perished. [page 204]

Ned's conduct afterwards was not a little suspicious, for he mentioned he had warned Mr. Douglass against the dangers of these pits, and had accompanied him to within a short distance of them. So strong were the suspicions against him, that a post-mortem examination took place by Drs. Judd and Rooke; but nothing could be elicited, for all the wounds were such as Mr. Douglass might have received from the animal. Few deaths could be more awful than that which he is supposed to have suffered.

⁷ This must be an error on the part of Wilkes, as Hawaiians had a distinct name for each species — 'Io, being the hawk; and 'Alalā, being the crow.

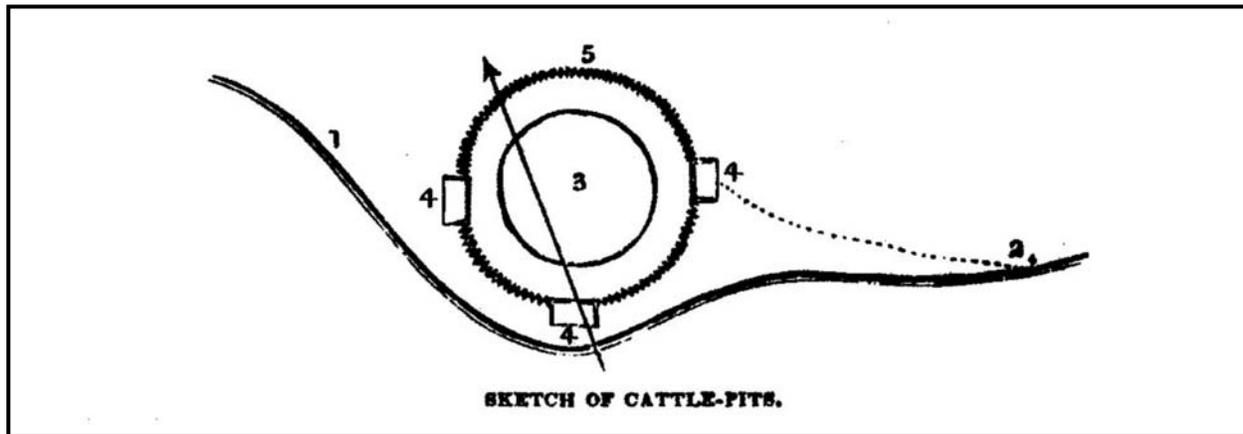


Figure 3. Sketch of Cattle-Pits in the Keahua-ai-Keanakolu Vicinity, place of the death of David Douglas (Wilkes 1970:204)

1. Path leading from Ned's House.
2. Place where Mr. Douglass left his bundle and dog. Track towards the pit in which he was found with the bull, gored to death.
3. The pool of water.
4. The three pits.
5. The fence which surrounds the pool and compels the cattle to pass over the pits.

The locality of these pits is in a dell, with banks sloping on both sides; the one to the northwest is about twenty feet high, while that to the southeast is about thirty feet. On each side, both above and below, thickets close the dell.

These pits are about seven or eight feet long, and four feet wide, and are walled up; they are placed broadside to the water.

Bullock-hunting seems to partake somewhat of the dangers of the chase of wild beasts, and has much of its attraction. Many stories are related of natives having been tossed, gored, and carried on the animal's horns for hours, and from these reports the natives are easily alarmed with the appearance even of a half-tamed animal, as we had abundant reason to observe on our way up Mauna Loa.

A story was related of a native, who, having prepared a pit, succeeded in entrapping a large bull, but became so excited at his success, that he slipped and fell in himself; however, being armed with a knife, he succeeded in killing the animal; when discovered both were dead.

Mr. Castle had three ribs broken, and Ragsdale, our old guide, a leg fractured, while hunting; and many other rencontres, partaking too much of the marvelous to be repeated here, were told me.

They encamped for the night in an old bark hut, in the line of woods. The 16th was rainy, but they continued their way down the mountain in a north-northeast direction, passing through the woods. The path was wretched, and full of mud and mire. The last part of the way the trees became more numerous, and consisted, besides the *ohea* and *koa*, of the *Ilex*, *Aralia*, *Myoporum* (false sandalwood), several *Compositae*, a *Silene*, and four or five species of *Lobelias*, with handsome flowers, mostly blue. Lower down, near a deserted hut, they unexpectedly found a *mamane* tree, which they were told had been painted for the purpose of enticing the birds.

From scrambling over roots and through mire, they were much fatigued before they reached Puahai [Puuohai]. This village contains a few straggling houses on the table-land; it is distant about two miles from the sea and twenty-five miles to the northwest of Hilo. The natives here appeared to be much more primitive than they were in other places, and had had but little intercourse with strangers. It was with some difficulty that provisions could be procured; a dollar was demanded for a turkey, and four needles for a chicken. No more than three of the latter could be found in the village. Their guide met with considerable delay in getting the necessary quantity to supply the [Wilkes 1970:205] party. At Puahai they were permitted to occupy the school-house, and remained over Sunday... [Wilkes 1970:206]

Laupāhoehoe Environs Described in 1877: Report of the Royal Commissioners on Development of Resources

In 1876, King David Kalākaua appointed a commission “to aid in the development of resources in the Kingdom” (Act of September 25, 1876). In 1877, the Commissioners toured the Island of Hawai‘i, assessing needs, development potentials, and meeting with residents to discuss the general nature of the resources. The Commissioner’s report, published in 1877, provides readers with important descriptions of the near-shore and lower forest lands of the Laupāhoehoe vicinity and neighboring lands, and sets the foundation for subsequent land use throughout the region.

April 27, 1877 — Report of Royal Commission:

...The undersigned, Commissioners appointed by His Majesty the King in Privy Council under the Act “To aid in the development of the resources of the Kingdom,” approved on the 25th day of September, A.D. 1876, would respectfully report.

The Commissioners, in pursuance of the first Section of said Act, left Honolulu on the 20th day of February, 1877, on Her Britannic Majesty’s Ship “*Fantome*,” which vessel had been kindly tendered by H.B. M.’s Commissioner and Consul General, Major James H. Wodehouse, to convey the Commission to Hawaii.

...District of Hilo.

The first point examined in this district was the proposed landing at Ookala. A gulch runs down to the shore, where it ends in a cliff some 200 feet high. To the eastward of the gulch a small point of land makes out into the sea with a projecting reef of rocks, making a small cave which is smooth in ordinary weather and affording an opportunity for a derrick. The cliff is very precipitous and overhangs the sea in places. A road of tolerable grade can be constructed from the landing along the side of the cliff to the foot of the gulch, and roads from that point up to both sides of the gulch to reach the adjoining lands of Kaiwiki and Kaala on one side, Ookala, Humuula and Waipunalei on the other. These lands are taken up already for cane planting.

At Laupahoehoe the landing is very good and the lands rich. Messrs. Lidgate and Campbell have fine cane growing and every prospect of success in their enterprise at this place. The roads on the Laupahoehoe palis should be improved. From this, to the land of Maulua on the lands of Koamano, Lauhulu, Kihalani and Papaalooa, Hookumahoe and others are very fine lands. Some of the lands are let and some 1000 acres sold, but there are some 3000 acres cane land left in the vicinity, of Government lands, making some 4000 acres in all; also from 10,000 to 15,000 acres of forest lands, which should be preserved. If parties could be induced to put up a mill on the central factory system on one of these lands, and the rest let out to small farmers, an admirable opportunity would

be given to parties of small means and to the native Hawaiians in the vicinity. Probably Hawaiians in other parts of the district would gather here if such a prospect was held out, and the same happy results which have occurred in Kohala ensue. The Government lands, or such parts as were reserved, would become of greater value and yield a good rental.

An enterprise of this kind in each district would be invaluable in establishing centers of influence and society, which would attract emigration, demonstrate the capacity of the soil, and thus give a value to all the surrounding lands. There is no lack of water, and with good roads to Laupahoehoe there would be no trouble about shipping produce. On the forest land back of these lands there is a large extent of coffee lands. The Commission would recommend that the Government lands here be devoted to the effort to establish a central factory, and to promote immigration; also that part of it be reserved till Legislative authority can be obtained to allot it in small parcels to immigrants.

At Kaiakea there is a good landing, which would require a road to connect and a mooring buoy. Next to the land of Maulua there are 1000 acres of good cane land belonging to Government. All these lands should be surveyed and devoted to the development of this rich district. The Commission earnestly recommend that the Government Surveyors be instructed to survey the coastline and at the Government road, which would give correct initial points for other surveyors to work from in prosecuting surveys. Surveyors should be sent for from abroad to prosecute this work if necessary. Some of them would probably settle on some of the lands, and be valuable additions to the population of the district. The Government should have on roads, landings and surveys, a dozen or more civil engineers as soon as practicable.

The landing at Hakalau was examined. An iron pier to connect the beach with a point of lava on the east side of the bay, would give a fair landing, but the expense would be great; as well as connecting roads up the palis. If mills were put in the gulch it would be advisable to make the landing available for surf boats. That Government have about 1500 acres of good land in the vicinity, and there is a large quantity of lands belonging to private parties.

At Honomu, in ordinary weather, a good landing can be made in a surf boat, and would only need a buoy; parties are projecting a small plantation on this land with a mill in the gulch. There are some 1500 acres of Government land in the vicinity, and 1250 sold to private parties, some of which is cane land. The establishment of a good mill at Honomu would greatly add to the value of these lands. From this land on to Hilo the land is largely under cultivation, the Plantations of Kaupakuea, Onomea, Papaekou [Pāpa'ikou] and Paukaa lying along here. On these estates the introduction of new canes and methods of cultivation have shown the capacity of the lands to produce large crops, and their prospects are very flattering. They will doubtless become very valuable estate, and show what with labor can be accomplished in this district, many of the best lands of which are yet undeveloped. Back of these plantation lie large lands adapted to coffee culture. The coffee plantation of Mr. William Kinney is an evidence of the great value of this land for this product, and demonstrated what can be accomplished by energy, even without large capital. Mr. Kinney has now growing on eighty acres some 100,000 coffee trees in splendid condition, and in the neighborhood of his plantation,—in fact the whole belt of land lying in the back part of the Hilo District, ranging from 1000 to 2000 feet above sea level, is capable of equal cultivation.

In our opinion, this land for the purpose of coffee cultivation is equal to any in the world. The abundant supply of water gives valuable facilities for fluming the berries to the beach, where the necessary machinery and appliances for cleaning and drying could be

erected. If such flumes were erected and appliances furnished to clean and prepare the coffee at fair rates or on shares, and lands then thrown open to actual cultivators, a great opportunity would be offered to settlers, and the value of the lands greatly enhanced to their proprietors.

The Commission would recommend that Government lands in that district be surveyed and let to actual cultivators in alternate sections, with such conditions as may be necessary to reserve water and rights of way for flumes, and the balance reserved to offer in smaller lots to immigrants after the sections first disposed of are under cultivation, and the value of the business demonstrated.

The lands will produce abundantly of *kalo* with little labor, which is a profitable crop, and settlers with small means can raise most of their requirements, while the coffee trees are maturing, which they will do in three years; after four years the crop would be continuous and yield a regular income... The Commission believe that many of the improvements recommended for the Hamakua and Hilo Districts, should be begun as soon as possible, to give confidence in the intention of the Government to carry them on and give an impetus to enterprise, especially with regard to mills to grind on shares of cane raised by small cultivators.

Natives show a commendable zeal to cultivate on their own account, which should be encouraged wherever possible. Immediate steps should also be taken for the introduction of laborers, that enterprises may be undertaken, and especially to bring into the Kingdom a class of people who would bring their families and perhaps assimilate with the Hawaiian race. Probably in India such could be found, and the Commission would earnestly recommend that Government lands be reserved to give such, if after completing their contracts of service they would settle on them and cultivate them.

As in the case of Hamakua District, good lands are spoken of as cane lands or coffee lands; but these lands adapted to the cultivation, in many places, of oranges, limes and other fruits. Forests of Sumach are growing wild, and as this has been said to be the Sumach of commerce, which when prepared for tanning purposes is worth in California \$150 per ton, the Commission recommend that the Government have some prepared for shipment to ascertain its quality and value. California now receives its supplies from distant Sicily, while probably the forests of Hamakua and Hilo could supply the whole of the demand of the northwest coast of America... [Report of the Royal Commission, April 27th, 1877 – in the Pacific Commercial Advertiser, May 1877]

Laupāhoehoe Described in George Bowser's "Directory and Tourists Guide" (1880)

George Bowser, editor of "*The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide*" (1880) wrote about various statistics and places of interest around the Hawaiian Islands. Describing the Laupāhoehoe Sugar Plantation and resources of the region forests, Bowser wrote:

Laupahoehoe, twenty-eight and one-half miles from Holo. Post-office address, Laupahoehoe, Hilo Road. Proprietors, W. Lidgate & Co., members of firm, William Lidgate and Theodore H. Davies; [page 412] Manager, W. Lidgate; agents in Honolulu, Theodore H. Davies; rent, 10,000 acres, under cultivation 900; 2000 available for sugar planting; capacity of mill, eight tons per day; men employed, 70; oxen, 50 yoke; mules, 50 head; established number of tons for 1880, 600. This plantation has unusual water facilities and the cane is flumed for a distance of from two to four miles, to the mill. There is also an excellent landing at this plantation. [Bowser, 1880:413]

In the following excerpts from “An Itinerary of the Hawaiian Islands...” (Chapter IV Hawai‘i), Bowser described the region between Hakalau and ‘O‘okala. He reported that while the Laupāhoehoe Sugar Plantation was in business, the lands about Laupāhoehoe, were as yet unsettled by white men. Bowser also reported that the Laupāhoehoe region was noted for its forests, and that there were rich stands of *koa* to be found:

On a lovely morning, the second morning after my departure from Hilo, I arrived at the Hakalau sugar plantation, the property of Messrs. Claus Sprekels & Co. This is about fourteen and a half [page 535] miles from Hilo. The operations here are on a very extensive scale; but I need not repeat information as to details, which will be found in my general account of the sugar plantations of the Kingdom. On the road from this place to the sugar plantation of Messrs. W. Lidgate & Co., at Laupahoehoe, I had an opportunity of gleaning information about some of the native woods. I learnt that there are five different varieties of *Koa*, all of which are very suitable for the manufacture of household furniture and cabinet-ware, and all of which take a very fine polish. Among the other trees growing in the forests on this coast there are to be found some that are suitable for almost every purpose for which we require to use timber, and the supply is almost unlimited. Mingled with these, the variety of fruit tree to be found in the forest is something surprising. Mountain apples, bananas, orange trees, tamarinds, mangoes, limes and guavas are to be found everywhere in profusion.

On the way to Laupahoehoe the road is not first-rate, even in the fine weather I enjoyed on my trip, besides which there are a great number of deep gulches, the sides of which are very steep. The track is certainly very rugged and uneven; but, then, to make up for it, the scenery with a parallel in the world. All the way from Hakalau to Laupahoehoe, the country is as yet unsettled by the white man, although in that stretch of about fourteen miles of coast, by a width of a great many miles inland, the land is suitable for the culture of sugar, coffee, wheat, oats, barley and many minor crops, and only wants the presence of capital and industry to make it a veritable paradise. Good landing can be obtained about every two miles along the coast, places which only require the expenditure of from three to ten thousand dollars to make the landing facilities good in any weather and all times of the year. The only inhabitants of this wide tract are some thirty native, who own among them about 3,000 acres, of which they cultivate about 150. The rest of the land belongs principally to the King and to members of the royal family. Laupahoehoe is a singular place, standing on lava, which has been declared to be the last expiring effort of Maunakea, a strip running right to the sea, down the great rent in the coastline, which forms the Laupahoehoe Valley. The climb out of this valley, on starting northward, is rather an undertaking, being on a circuitous track, up what is nearly a precipice, over 1,500 feet high.

From Laupahoehoe to the plantation of the Ookala Sugar Company the road is a very fair one, although there are numerous gulches to [page 536] traverse. Here again, but little of the land is cultivated, and thousands of acres remain to be taken up by the settler of the future... [Bowser, 1880:537]

Native Residency and Land Use in Hilo Palikū Described by King Kalākaua (1888)

In 1888, King David Kalākaua, had published a book under the title of “Legends and Myths of Hawaii” (Kalakaua, 1972). In his account of the Chief, ‘Umi a Liloa (ca. 1500) — who for a time resided in the Waipunalei-Laupāhoehoe vicinity — King Kalākaua provided readers with a description of the lands and land use in the region of interest to this study:

The northeastern coast of the island of Hawaii presents an almost continuous succession of valleys, with intervening uplands rising gently for a few miles, and then more abruptly toward the snows of Mauna Kea and the clouds. The rains are abundant on that side of the island, and the fertile plateau, boldly fronting the sea with a line of cliffs from fifty to a hundred feet in height, is scored at intervals of one or two miles with deep almost impassable gulches, whose waters reach the ocean either through rocky channels worn to the level of the waves, or in cascades leaping from the cliffs and streaking the coast from Hilo to Waipio with lines which seem to be molten silver from the great crucible of Kilauea.

In the time of Liloa, and later, *this plateau was thickly populated, and requiring no irrigation, was cultivated from the sea upward to the line of frost.* A few *kalo* patches are still seen, and bananas grow, as of old, in secluded spots and along the banks of the ravines; but the broad acres are green with cane, and the whistle of the sugar-mill is heard above the roar of the surf that beats against the rock-bound front... [Kalakaua, 1972:284]

A Visit to Keanakolu Vicinity and the Upper Laupāhoehoe Forest Region in the 1880s

In the September 1909 issue of *Paradise of the Pacific Magazine*, Lillian Shrewsbury Mesick, described the fruit orchard of Keanakolu. In her article she referenced notes prepared by J.M. Lydgate—of the family which at one time managed the Laupāhoehoe Sugar Plantation venture—in which he recounted a visit to the orchard in ca. 1885. Through the notes we find confirmation of several important facts, which are also alluded to in other historical accounts. Among these points are: the old Humuula Sheep Station facility was at one time situated at Keanakolu; and numerous fruit trees were introduced and planted in the region around the 5,000 foot elevation prior to the 1880s (see oral history interviews in this study). Mesick wrote:

An article in a recent number of the *Advertiser* written by the Rev. Mr. J. M. Lydgate has made me wonder whether or not the dream of the so-called visionary who favors the coming of the small farmer and fruit-raiser is indeed “as a dream of a night vision” or a foresight of what actually is to come.

Mr. Lydgate visited an abandoned fruit orchard at Keanakolu, which is situated on the southern slope of Mauna Kea on the Island of Hawaii at an elevation of about five thousand feet. This orchard was planted about twenty-five or more years ago close to where the Humuula Sheep Ranch house was then situated. The headquarters at Keanakolu were afterward abandoned and the fruit orchard was left uncared for.

Very fortunately, however, a fence strong enough to prevent cattle, wild goats, and other animals from damaging the trees had been erected, and it is because of this that we are enabled to judge of what results might have been obtained in other places had the same condition prevailed. The trees at *Keanakolu* were overrun with such a growth of weeds and underbrush as might naturally be expected in a location which has been uncared for during a period of twenty years. The trunks and limbs were covered with the long gray moss so common to neglected trees and shrubbery, but the fruit—several varieties of which were ripe—were all that could be desired, and far more than could well be expected under the circumstances.

Mr. Lydgate found apple, plum, pear, apricot, cherry, and peach trees, and several varieties of each. He states that the apple trees run mostly to whips, causing a meager crop of fruit, but Mrs. Lydgate claims that those she saw were of excellent quality. The

fine crop of Bartlett pears and the cherries and peaches were, at the time of their visit, too green to eat, though the cherries, which were few, are probably ripe by this time. There were but few peaches, but those seen were of good size. The plum and apricot crops had already matured and there was no fruit left by which one might form an opinion, but it is said that the fruits have been gathered by those who have visited the orchard during the past few years, and have been found equal to those grown on the mainland.

One peculiarity that Mr. Lydgate could not explain was the ripening of the apricots long before the cherries. The opposite condition prevails in California, apricots coming into market there some weeks after the close of the cherry season. Mr. Byron O. Clark tells me, however, that he has known apricots to ripen in Southern California in April, so the unusual condition at Keanakolu may be due to a very early variety of apricots and a late variety of cherries having been planted there. This is not entirely a satisfactory theory, however, as cherries in California usually have disappeared entirely when the first apricots come into market.

Mr. Lydgate states that he found a considerable number of Loganberry bushes in the enclosure on which the fruit was just beginning to ripen. The bushes were in a very thrifty condition—so very thrifty that the fear was expressed that they might in time become such a pest as the common Jamaica thimbleberry, which is said to have been imported fifteen or twenty years ago, is now on the Island of Hawaii.

The trees and bushes in the orchard at Keanakolu are reported to be entirely free from all disease and in a surprisingly healthy condition, considering the neglect of something like a quarter of a century. This is surprising to one who knows the fate of abandoned orchards on the Coast. There, without some care, the trees become dwarfed and stunted and the fruit scarce, small, and of inferior flavor and grain. [Mesick in *Paradise of the Pacific*, September 1909:21]

Documentation of Heiau and Cultural Sites in Laupāhoehoe and Vicinity

In between 1908 to 1919, several writers penned accounts pertaining to *heiau* (ceremonial sites) and historical accounts of Laupāhoehoe and neighboring lands. The earliest of these accounts was compiled by Thomas Thrum—based on more than 20 years of documentary research and field trips—was published in the *Hawaiian Annual* of 1908. In 1906, the Bernice Pauahi Bishop Museum sent J.F.G. Stokes to the island of Hawai'i to conduct a survey of *heiau*, and among his findings were sites of the Laupāhoehoe vicinity (Stokes, ms. 1919 & 1991). In 1913, W.H. Whitney, published a visitor's guide to the island of Hawai'i, which included details of sites in the area. And in 1930-1932, Alfred Hudson conducted a survey of sites of East Hawai'i for the Bishop Museum (Hudson Ms., 1932). Hudson's work in Laupāhoehoe included references to the above authors, and updated accounts on the condition and history of the sites at Laupāhoehoe.

While none of the cultural sites described in the following narratives are directly associated with the upper forest lands, they do ascribe a significance to the larger land area, as expressed in earlier accounts of Laupāhoehoe (in this study).

Field Survey of Laupāhoehoe (1906)

In 1906, J.F.G. Stokes provided the following descriptions of sites visited or previously recorded at Laupāhoehoe:

Moeapuhi Heiau

Heiau of Moeapuhi, Laupahoehoe, Hilo. Laupāhoehoe New benchmark bears 129° 56, 1965 feet. This *heiau* destroyed to provide a site and material for the Laupahoehoe Sugar Company's former mill.

No ancient traditions relating to this *heiau* were obtained. The natives, however, state that on account of the destruction of the holy place to build the mill, the running of the latter was never satisfactory. Later the mill was removed with its foundations, to a site at Pāpa'aloa and that bad luck followed it. (I have not verified the statements.) From one of the old men it was learned that the actual destruction of the *heiau* was carried out by natives working for the sugar company. When the workmen had gathered at the *heiau*, the native foreman offered up a prayer to the ancient gods, explaining that they destroyed the *heiau* at the employers' orders and that if any vengeance was to follow it should not be visited upon the workmen, but upon those under whose orders the destruction was carried out.

Kama'o Heiau

Heiau of Kama'o, land of Laupāhoehoe, Hilo. Laupāhoehoe New benchmark bears 98° 54', 1103.4 feet. The *heiau* has been destroyed. Its former site in a coconut grove, in the village, about a quarter of a mile from and south-west of Laupāhoehoe landing. [Stokes, 1991:156]

Lonopūhā Heiau

Heiau of Lonopūhā, land of Laupahoehoe, Hilo. Laupahoehoe New benchmark bears 67° 13' 30", 2137 feet. The *heiau* has been destroyed. Its former site adjoins the light-house on the north-north-east.

***Papauleki'i Heiau*⁸**

Heiau (?) of Papaulekii. On the list received from Mr. Thrum in 1906 was a *heiau* under this name, said to be located at Laupāhoehoe. None of the natives knew of a *heiau* by that name. They did point out that Papa was the name of a place (site of present court house), where Kamehameha declared his *māmala hoe* law. Uleki'i, they stated, was the name of Laupāhoehoe boat landing, where formerly a large stone phallus stood. The boat landing is about 600 feet distant from the court house.

Mamala Heiau, or Ha'akoa Heiau

Heiau of Mamala or Haakoa, land of Haakoa and adjoining Waipunalei, Hilo. Located near the edge of the bluff overlooking Laupāhoehoe village. Laupāhoehoe New benchmark is located just outside of south-east wall.

This is a walled *heiau* that has served in modern times as a cattle and slaughtering pen. The walls at present average 4.5 feet in height; the southern wall is 6 feet wide, while the opposite wall is only 5 feet wide. The present floor is earth, well trampled, but there are so many smooth beach pebbles in the soil, that it seems probable that the floor was paved with them. The remains of a stone platform are to be found in the north corner. No local history was obtainable. It was probably this *heiau* at which the chief Paiea was sacrificed by Umi [Stokes 1991:157].

⁸ In "Place Names of Hawai'i" (Pukui et al., 1974:130), reference is made to Papauleki'i as a part of the citation for Laupāhoehoe. Readers are told that:

"A man who came from Kahiki and thence to the canoe landing at Laupāhoehoe built a *heiau* here called Ule-ki'i (penis fetching). The man turned into a *pāo'o* fish, and his sister into an 'a'awa fish. Fishermen who wanted to catch them were surprised to see them turn into human beings."

Thrum's Hawaiian Annual (1908)

Thrum's Hawaiian Annual for 1908 offered the following names and brief descriptions of *heiau* at Laupāhoehoe:

Kamao	Laupahoehoe, nothing now remains.
Papaulekii	Laupahoehoe, site of present court house.
Lonopuha	Laupahoehoe, site near present light house.
Moiapuhi	Kiilau, old Laupahoehoe mill site; destroyed in 1876 when the mill was built.
Mamala	Haakoa, on a bluff above Laupahoehoe village; a walled <i>heiau</i> 160x130 ft., class unknown; used for years past as a slaughtering pen.
—	Waipunalei. At this <i>heiau</i> Umi sacrificed Paiea whom he had caused to be slain on coming to power, about 1490 (Thrum, 1908:41).

Visitor's Guide – Laupāhoehoe Described in 1913

In 1913, W.H. Kinney published "The Island of Hawaii," a visitor's guide to the island, with details of historical interest to visitors of the time. His narratives of Laupāhoehoe, inform readers of lodging and meals, and describe several of the ancient *heiau* (temples) known to have occurred in the area.

Laupahoehoe (leaf of lava) is an extensive village situated at the mouth of a deep gulch, on a flat stretch of land. It has the only landing used for passengers on this side of the island, outside of Hilo. It has a hotel (Rates: \$1 a day. \$10 a month). Opposite the hotel which sells no meals, is a good Chinese restaurant (Dinner \$1. Other meals 50 cents each. Longer stays \$1.50 a [page 29] day). There is a branch of the Volcano Stables Co.

Laupahoehoe is one of the great places of Hawaiian history and folklore, though most of this is rapidly being forgotten. There were many *heiaus* here, probably because here was the only beach along the coast where convenient access could be had to the kind of rocks generally used in their construction. The largest of these, Haakoa, was on the top of the *pali* north of the gulch. Here lived Umi, a famous king. Only scattered stones remain.

Moiapuhi was another *heiau*, on the flat stone and stone beach on the south side of the flat. It was destroyed in order that its stones might be used in the foundations of the old Laupahoehoe mill, before the present mill was built at Papaaloa.

On the courthouse grounds stood another *heiau*, **Papaulekii**, and the old Hawaiians still insist that on certain nights the jail is haunted.

Near the lighthouse sites stood still another *heiau*, **Lonopuha**, where a great and famous sacrificial stone is hidden. The Hawaiians claim that only one man today knows its hiding place, and he will not reveal it, fearing that the gods will punish him with death should he do so.

Hakalau was another *heiau*, which stood by the coconut grove on the south side of the settlement. It is reported that on the night of Ku, particularly, drumming was heard from various of the *heiaus*, one taking it up after the other. The order in which it began and ended was fraught with significance. Thus if it began and ended in a certain rotation, it presaged death.

The surf south of the settlement is called the "*Nalu o Umi*," the surf of Umi. When Umi came to Laupahoehoe, the chief who reigned there, Paiea, was a famous surf-rider, and the surf was called after him the "*Nalu o Paiea*." Umi, who was also a fine surf-rider, challenged him to a race. They agreed that the loser should be baked in an *imu* (oven). They started out with their surf boards, Umi leading the way. They started back from far out at sea, but as they neared the settlement, Umi was swamped. He dived and managed to reach the shore before Paiea, who was baked at the flat place near the lighthouse. Umi succeeded Paiea as ruler, and the surf was named after him. Leaving Laupahoehoe the road passes, north, through the big Kaawalii gulch, and on to Hamakua. [Kinney, 1913:31]

Sites and Recollections of Laupāhoehoe in 1930

Hudson (ms. 1932) described in detail the *heiau* and other sites of archaeological interest on Laupāhoehoe Peninsula and down the North Hilo Coast as they appeared in 1930 when he surveyed them:

Site 22.

Mamala *Heiau*, Waipunalei, on the ridge known as Haakoa overlooking Laupahoehoe village. The name Mamala is given by Thrum; but the name is known locally as "Haakoa," which seems to be a place name applied to the ridge on the north side of Laupahoehoe gulch and is so indicated on the U.S. Geological Survey maps. The walls, though in thick guava, are in fairly good condition but the west end has been mostly destroyed by the tracks of the Hawaii Consolidated Railway.

The structure appears to have been a walled enclosure of diamond shaped outline, the long axis extending along the top of the ridge. The north wall at present is 160 feet long but its west end has been destroyed by the railway cut. The west wall is somewhat irregular and built on a slight curve. It extends for 150 feet until it too terminates at the edge of the railroad cutting. The south wall is broken by a slight angle into two sections of 50 and 40 feet, the latter portion somewhat destroyed. On the east end of the *heiau* the wall is straight for 85 feet but in much better condition at its north end than the south. The walls vary in height according to their condition from 4 to 6 feet and are 3 to 4 feet wide across the top.

The presence of the railway cut makes it difficult to determine accurately the original size of the structure. At present the north and east walls terminate abruptly at the edge of the cut whose width is about 40 feet across the top. On the opposite side is found a rough stone platform about 12 feet square. The lines of the north and west walls if extended across the cut would intersect at this point. It seems probable therefore that the platform formed a part of the *heiau*. This supposition, however, makes the length of the north and west walls 200 and 190 feet respectively, which is a marked discrepancy from Thrum's measurements made before the building of the railway.

There is no trace of interior walls or platforms except that just noted. In any case such features would probably have been destroyed while the site was used as a slaughter pen. Bits of paving of small beach stones are to be found here and there. There is an opening in the middle of the north wall and another at the southeast corner, but these features may not be original to the structure.

In the middle of the west wall is a modern concrete lined excavation 12 feet square and 5 feet deep. [Hudson, ms. 1932:204-205]

Laupahoehoe itself is a fairly level, leaf-shaped lava peninsula protruding half a mile into the sea from the general line of the precipitous coast. Behind it a deep but narrow gulch extends about two miles inland. Macrae describes Laupahoehoe in 1825 as a “small stony flat with a few huts and sweet potato and taro patches scattered over it.”

There were several *heiau* on the peninsula but there is much confusion over their names and locations. [page 206]

Site 23.

Thrum...speaks of a *heiau* named “Lonopuha” near the lighthouse, and Kinney...also gives this name. Mr. Makanui of Laupahoehoe, deputy sheriff of North Hilo, says that it was named “Papa.” The archaeological remains in the vicinity have been much disturbed in laying the foundations for the beacon light. There is a platform 25 feet square and four feet high with a low terrace on three sides. The paving is of small pebbles with an area in the center covered with large flat stones. [page 207]

Site 24.

At the canoe landing was another *heiau* named, according to Thrum and Kinney, Papaulekii. Mr. Makanui says this name should be divided between two *heiau*, “Papa” the site described above, and “Ulekii,” the present one. Here there is an irregularly shaped mound of earth some 15 feet square with traces of stone facing along the sides.

Kinney mentions a *heiau* named Hakalau which he says “stood by the coconut grove on the south side of the settlement.” Thrum gives “Kamao” as the name of another temple with the note that “nothing remains.” No one with whom I talked in Laupahoehoe knew of these sites.

Northwest of the lighthouse behind the school is a place known, according to Mr. Makanui as the “Imu o Paiea” (oven of Paiea).

Local tradition says that after Paiea's body was offered as a sacrifice at Waipunalei it was brought to this place, cooked, and eaten. There is little information on the subject of cannibalism in Hawaii but in view of its existence in other parts of Polynesia it is not unlikely that it was practiced at one time or another. [page 209]

In the sea on the Hilo side of the peninsula is a stone named Poluku which is associated with the legend of Umi's surfboard match with Paiea. Umi is said to have taken advantage of the way in which the surf broke on the stone and so was able to win the contest. [page 210]

On a small point by the sea on the north side of Laupahoehoe peninsula under the cliff is a large flat stone called Hokua. In the cliff above this and 75 feet below the turn in the road is a cave called Hokuli which is known locally as Umi's cave. His god Kaili is said to have been concealed here while Umi was living in disguise in the neighborhood.

A stone below Kaahumanu hall was named Kuliawela. Puehu is the small hill on the Hilo side of the former court-house site. The present park area was known as Huia. Back of the new court-house was the beginning of a trail leading inland. This was probably the trail followed by Macrae.

The hill by the landing is named Wainaia. The old people of Laupahoehoe say that here Kamehameha proclaimed the Mamalahoa Law on his return from the raiding expedition to Puna known as the “Kaleleike.” This belief, however, is probably a distortion of the traditional account in favor of local pride. It seems probable that the law was not proclaimed until several years after the event which it commemorated. [page 212]

On the beach at Kiilau [Kilau] a short distance on the Hilo side of Laupahoehoe stood a *heiau* named Moiapuhi. According to Thrum it was destroyed in 1876 when the old Laupahoehoe mill was built on the same site. Kinney says that the stones of the *heiau* were used in the foundations of the mill.

Above Kiilau is a cave called Kukahauula which is reported to have openings at Aulilii, Kalaehala, Hokuli, Kaleiinaakeakua, and Lapalapa. These were not found. [Hudson, ms. 1932:213]

LAND TENURE: DISPOSITION OF LAUPĀHOEHOE AND AHUPUA‘A WHICH MAKE UP THE FOREST REGION

This section of the study provides readers with a background of land tenure in the Laupāhoehoe region. Documentation from the *Māhele ‘Āina* (a program that introduced fee-simple ownership of property to the Hawaiian people); Royal Patent Land Grants; Government Leases for lands (within and adjoining the Laupāhoehoe forest region); the Hawaiian Homesteading program (1884-1914); as well as a history of the Laupāhoehoe Sugar Company and Mill operations are included. All of these records provide us with accounts pertaining to land use and the gradual change in conditions, as uses extended into and around the forest lands.

Māhele ‘Āina (The Land Division of 1848)

In pre-western contact Hawai‘i, all land and natural resources were held in trust by the high chiefs (*ali‘i ‘ai ahupua‘a* or *ali‘i ‘ai moku*). The use of lands and resources were given to the *hoa‘āina* (native tenants), at the prerogative of the *ali‘i* and their representatives or land agents (*Konohiki*), who were generally lesser chiefs as well. In 1848, the Hawaiian system of land tenure was radically altered by the *Māhele ‘Āina* (Division of Lands). This change in land tenure was promoted by the missionaries, the growing Western population, and business interests in the island kingdom. Generally these individuals were hesitant to undertake businesses on lease-hold lands.

In 1848, the *Māhele ‘Āina* defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *Konohiki*. As a result of the *Māhele*, all land in the Kingdom of Hawai‘i came to be placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands (to support public works and government programs); and (3) *Konohiki* Lands (for the chiefs associated with the Kamehameha lineage and rise to power). Subsequently, the *hoa‘āina* (native tenants), were granted the right to claim parcels of land for their personal use from lands situated in the three categories of land listed above. The “Enabling” or “*Kuleana Act*” (formally submitted to the King in December 21, 1849, and approved on August 6, 1850) laid out the framework by which native tenants could apply for, and be granted fee-simple interest in “*Kuleana*” lands, and confirmed their rights of access to, and collection of resources necessary to their life upon the land in their given *ahupua‘a*. The Act reads:

August 6, 1850

An Act confirming certain resolutions of the King and Privy Council passed on the 21st day of December 1849, granting to the common people allodial titles for their own lands and house lots, and certain other privileges.

Be it enacted by the Nobles and Representatives of the People of the Hawaiian Islands in Legislative Council assembled;

That the following sections which were passed by the King in Privy Council on the 21st day of December A.D. 1849 when the Legislature was not in session, be, and are hereby confirmed, and that certain other provisions be inserted, as follows:

Section 1. Resolved. That fee simple titles, free of commutation, be and are hereby granted to all native tenants, who occupy and improve any portion of any *Government land*, for the land they so occupy and improve, and whose claims to said lands shall be recognized as genuine by the Land Commission; Provided, however, that the Resolution shall not extend to *Konohikis* or other persons having the care of Government lands or to the house lots and other lands, in which the Government have an interest, in the Districts of Honolulu, Lahaina and Hilo.

Section 2. By and with the consent of the King and Chiefs in Privy Council assembled, it is hereby resolved, that fee simple titles free of commutation, be and are hereby granted to all native tenants who occupy and improve any *lands other than those mentioned in the preceding Resolution, held by the King or any chief or Konohiki* for the land they so occupy and improve. Provided however, this Resolution shall not extend to house lots or other lands situated in the Districts of Honolulu, Lahaina and Hilo.

Section 3. Resolved that the Board of Commissioners to quiet Land titles be, and is hereby empowered to award fee simple titles in accordance with the foregoing Resolutions; *to define and separate the portions belonging to different individuals; and to provide for an equitable exchange of such different portions where it can be done, so that each man's land may be by itself.*

Section 4. Resolved that *a certain portion of the Government lands in each Island shall be set apart, and placed in the hands of special agents to be disposed of in lots of from one to fifty acres in fee simple to such natives as may not be otherwise furnished with sufficient lands at a minimum price of fifty cents per acre.*

Section 5. In granting to the People, their House lots in fee simple, such as are separate and distinct from their cultivated lands, the amount of land in each of said *House lots shall not exceed one quarter of an acre.*

Section 6. *In granting to the people their cultivated grounds, or Kalo lands, they shall only be entitled to what they have really cultivated, and which lie in the form of cultivated lands; and not such as the people may have cultivated in different spots, with the seeming intention of enlarging their lots; nor shall they be entitled to the waste lands.*

Section 7. *When the Landlords have taken allodial titles to their lands the people on each of their lands shall not be deprived of the right to take firewood, aho cord, thatch, or ti leaf from the land on which they live, for their own private use, should they need them, but they shall not have a right to take such articles to sell for profit. They shall also inform the Landlord or his agent, and proceed with his consent. The people shall also have a right to drinking water, and running water, and the right of way. The springs of water, and running water, and roads shall be free to all should they need them, on all lands granted in fee simple. Provided, that this shall not be applicable to wells and water courses which individuals have made for their own use.*

Done and passed at the Council House, Honolulu this 6th day of August 1850. [copied from original hand written "Enabling Act"⁹ – HSA, DLNR 2-4]

The lands awarded to the *hoa'āina* (native tenants) became known as "*Kuleana Lands.*" All of the claims and awards (the Land Commission Awards or L.C.A.) were numbered, and the L.C.A. numbers remain in use today to identify the original owners of lands in Hawai'i.

The work of the Land Commission was brought to a close on March 31, 1855. The program, directed by principles adopted on August 20, 1846, met with mixed results. In its' statement to the King, the Commissioners to Quiet Land Titles (George M. Robertson, March 31, 1855) summarized events that had transpired during the life of the Commission:

...The first award made by the Commission was that of John Voss on the 31st March 1847.

⁹ See also "*Kanawai Hoopai Karaima no ko Hawaii Pae Aina*" (Penal Code) 1850.

The time originally granted to the Board for the hearing and settlement of all the land claims in the kingdom was two years, ending the fourteenth day of February, 1848.

Before the expiration of that term it became evident that a longer time would be required to perform a work... Accordingly, the Legislature on the 26th day of August 1847, passed an Act to extend the duration of the Board to the 14th of February, 1849, adding one year to the term first prescribed, not however, for the purpose of admitting fresh claims, but for the purposes of hearing, adjudicating and surveying those claims that should be presented by the 14th February, 1848. It became apparent to the Legislature of 1848 that the labors of the Land Commission had never been fully understood, nor the magnitude of the work assigned to them properly appreciated, and that it was necessary again to extend the duration of the Board. An act was accordingly passed, wisely extending the powers of the Commissioners "for such a period of time from the 14th day of February 1849, as shall be necessary for the full and faithful examination, settlement and award upon all such claims as may have been presented to said Board." ...[T]he Board appointed a number of Sub-Commissioners in various parts of the kingdom, chiefly gentlemen connected with the American Mission, who from their intelligence, knowledge of the Hawaiian language, and well-known desire to forward any work which they believed to be for the good of the people, were better calculated than any other class of men on the islands to be useful auxiliaries to the Board at Honolulu...

...During the ten months that elapsed between the constitution of the Board and the end of the year 1846, only 371 claims were received at the office; during the year 1847 only 2,460, while 8,478 came in after the first day of January 1848. To these are to be added 2,100 claims, bearing supplementary numbers, chiefly consisting of claims which had been forwarded to the Board, but lost or destroyed on the way. In the year 1851, 105 new claims were admitted, for Kuleanas in the Fort Lands of Honolulu, by order of the Legislature. The total number of claims therefore, amounts to 13,514, of which 209 belonged to foreigners and their descendants. The original papers, as they were received at the office, were numbered and copied into the Registers of the Commission, which highly necessary part of the work entailed no small amount of labor...

...The whole number of Awards perfected by the Board up to its dissolution is 9,337, leaving an apparent balance of claims not awarded of say 4,200. Of these, at least 1,500 may be ranked as duplicates, and of the remaining 2,700 perhaps 1,500 have been rejected as bad, while of the balance some have not been prosecuted by the parties interested; many have been relinquished and given up to the Konohikis, even after surveys were procured by the Board, and hundreds of claimants have died, leaving no legal representatives. It is probable also that on account of the dilatoriness of some claimants in prosecuting their rights before the Commission, there are even now, after the great length of time which has been afforded, some perfectly good claims on the Registers of the Board, the owners of which have never taken the trouble to prove them. If there are any such, they deserve no commiseration, for every pains has been taken by the Commissioners and their agents, by means of oft repeated public notices and renewed visits to the different districts of the Islands, to afford all and every of the claimants an opportunity of securing their rights... [Minister of Interior Report, 1856:10-17]

It is reported that the total amount of land awarded to *hoāina* equaled approximately 28,658 acres (cf. Kame'eleihiwa 1992:295).

There are found within the lands that make up the historic Hilo Forest Reserve (Laupāhoehoe-Welokā Section), fourteen *ahupua'a* or independent land areas. In addition to those fourteen lands, three additional *ahupua'a* bound those lands. The *Buke Mahele* (Division Book) of 1848 (copy of

1864), documents the agreements made between the King, Kamehameha III, family members, supporting chiefs, and others who supported Kamehameha I and his heirs in the period between the 1790s to the 1830s. The *Buke Mahele* also lists the lands granted by the King to the Government land inventory—financial gains of such lands going to the support of government operations, and for conveyance to Hawaiians and other parties in leasehold and fee-simple interests. *Table 1*, provides readers with a list of *ahupua'a* (north to south) and their disposition, which are a part of, or which were historically sustained by the forest resources of the present-day Laupāhoehoe-Welokā Forest Reserve. Also included are names and disposition of the lands which adjoin the boundaries of the primary *ahupua'a* associated with the forest region.

Table 1. Disposition of Lands in the Laupāhoehoe Vicinity Recorded in the Buke Mahele of 1848.

Ahupua'a	Owner of Claim (Documentary Reference)	Disposition
Waipunalei	Granted by Kamehameha III to Poka (Feb. 2, 1848, pp. 67-68). No native claims registered or awarded.	Private (adjoins the reserve; and is cut off by Humuula)
Haakoa (Hakoa)	Not recorded as an Ahupuaa in the Buke Mahele (perhaps an <i>ili</i> associated with Laupahoehoe). No native claims registered or awarded.	(Sold as a Grant to Thomas Spencer; <i>Helu</i> 3172)
Laupahoehoe 1 & 2	Relinquished by V. Kamamalu to Kamehameha III (Jan. 27, 1848, pp. 5-6). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 186-187). No native claims registered or awarded.	Government (cut off by Humuula)
Kilau	Granted by Kamehameha III to M. Kekauonohi (Jan. 28, 1848, pp. 27-28). No native claims registered or awarded.	Private (cut off by Laupahoehoe)
Puu Alaea (Pualaea)	Relinquished by Puhi to Kamehameha III (Feb. 9, 1848, pp. 128-129). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 190-191). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Manowaiopae	(Not recorded in the Buke Mahele). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Hokumahoe (Kumahoe)	Relinquished by M. Kekauonohi to Kamehameha III (Jan. 28, 1848, pp. 27-28). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 188-189). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Kihalani (Nakihalani)	Claim of Isaac Harbottle (foreigner), denied. Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 188-189). No native claims registered or awarded.	Government (cut off by Laupahoehoe)

Table 1. Disposition of Lands in the Laupāhoehoe Vicinity Recorded in the Buke Mahele of 1848. (continued)

Ahupua'a	Owner of Claim (Documentary Reference)	Disposition
Papaalooa	Granted by Kamehameha III to Pakeokeo (Feb. 2, 1848, pp. 71-72). No native claims registered or awarded.	Private (cut off by Laupahoehoe)
Kaiwilahilahi	Relinquished by Pakeokeo to Kamehameha III (Feb. 2, 1848, pp. 71-72). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 188-189). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Moanalulu	Granted by Kamehameha III to M. Kekauonohi (Jan. 28, 1848, pp. 27-28). No native claims registered or awarded.	Private (cut off by Laupahoehoe); recorded as a Government Land.
Kapehu	Relinquished by I. Kaiama to Kamehameha III (Mar. 7, 1848, pp. 176-177). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 190-191). One additional claim registered and awarded.	Government (cut off by Laupahoehoe)
Keaalau (Kaalau)	Relinquished by Kapu to Kamehameha III (Feb. 4, 1848, pp. 99-100) Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 188-189). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Paeohi	Relinquished by M. Kekauonohi to Kamehameha III (Jan. 28, 1848, pp. 27-28). Granted by Kamehameha III to Government Land Inventory (Mar. 8, 1848, pp. 188-189). No native claims registered or awarded.	Government (cut off by Laupahoehoe)
Weloka	Granted by Kamehameha III to M. Kekauonohi (Jan. 28, 1848, pp. 27-28). No native claims registered or awarded.	Private (cut off by Laupahoehoe); recorded as a Government Land.
Maulua nui	Granted by Kamehameha III to M. Kekauonohi (Jan. 28, 1848, pp. 27-28). One native claim registered, not awarded.	Private (cut off by Humuula)
Humuula	Relinquished by Victoria Kamamalu to Kamehameha III (Jan. 27, 1848, pp. 5-6). Retained as a part of the Crown Land Inventory of the King. No native claims registered or awarded.	Crown Land.

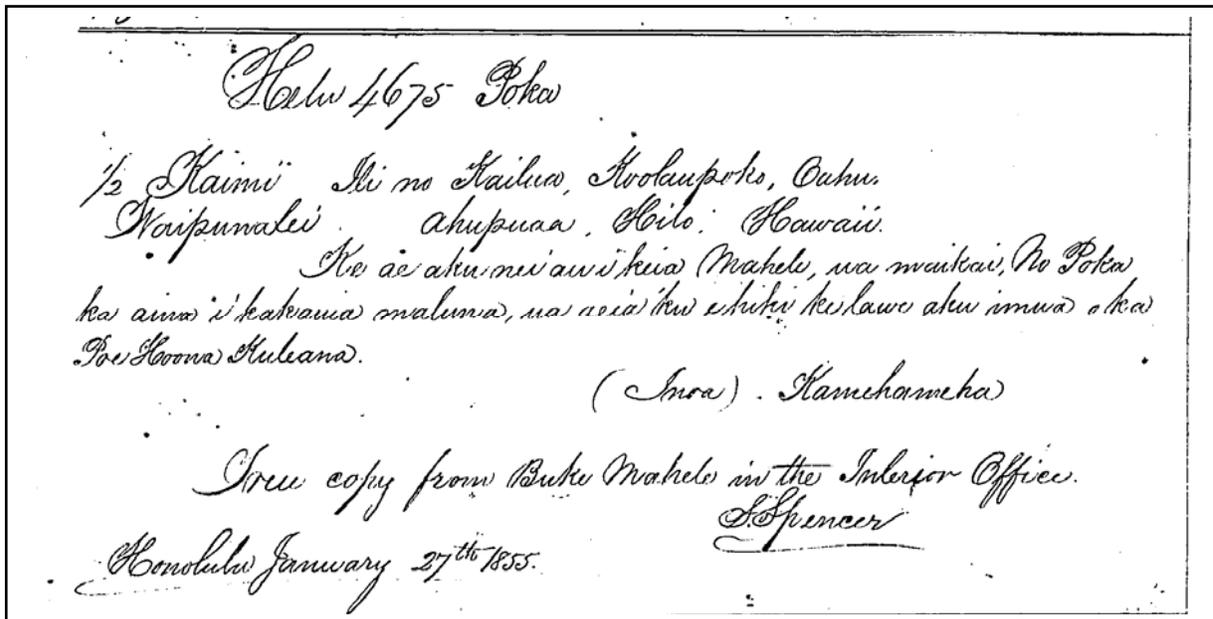
Descriptions of Land and Claims in the Mahele

In the years leading up to the *Māhele ʻĀina* the primary references to the mountain lands—those lands making up the *koa-māmāne* forest region and upper slopes of Mauna Kea—were in the context of the right to take cattle from the mountain lands, and the enforcement of a *kapu* on them. For reasons that are as yet unexplained, only one native tenant (someone other than an *aliʻi* or *konohiki*, and participant in the *Māhele* with the King) applied for *kuleana* land in the seventeen *ahupuaʻa* which are cited in *Table 1* (see the claim of Mohoole, *Helu* 3696 – not awarded). Thus, we have no specific accounts describing traditional land use or residency patterns from native informants of the period for the Laupāhoehoe vicinity lands. Below, follow citations (with selected copies of the original records included as unnumbered figures) from those limited claims—generally those of chiefly lineages—found in the books of the *Māhele* for the Laupāhoehoe vicinity lands.

One additional point is noted here, while researching the claim and award of Kauhola (*Helu* 7622 & 2289) for the *ahupuaʻa* of Kapehu, it was found that the notes of survey recorded in the *Mahele Award Book* and as a part of the Royal Patent on the Award, do not coincide with the Kapehu *Ahupuaʻa* of the study area (this irregularity was also observed in the Boundary Commission proceedings of 1895—Volume D, page 91). It seems that the surveyor placed the land in a different location, several miles away from the actual place (situating the surveyed Kapehu between Kaupakuea and Kaʻakepa *Ahupuaʻa*). What this means in regards to perfecting the title, may await legal settlement.

Ahupuaʻa of Waipunalei — Helu 4675 Poka (Native Register Volume 4:320)

(Poka was a *Konohiki* awardee, and by agreement with the King, received the *ahupuaʻa* of Waipunalei as a personal land. No genealogical information is known for him.)



Ahupuaa of Waipunalei — Helu 4675 Poka (Native Testimony Volume 10:453)



No. 6798

ROYAL PATENT.

Upon Confirmation by the Land Commission.

WHEREAS, The Board of Commissioners to quiet Land Titles have by their decision awarded unto

Poka

Kuhana Hele 4678

an estate of **Freehold** less than Allodial, in and to the Land hereafter described, and whereas *Thomas Spencer* the present occupier of the Ahupuaa of *Waipunaehi*, has presented to the Minister of the Interior a certificate from the Commissioner of Boundaries for the Island of Hawaii, defining the boundaries of said Ahupuaa, and has paid into the Royal Exchequer the sum of Eighty-three and Two Dollars, the Government commutation thereon, in accordance with an Act, approved the 29th day of July, A. D. 1872.

Kalahoua

THEREFORE, ~~by~~ by the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known to all men, that he has, for himself and his successors in office, this day granted and given absolutely, in Fee Simple, unto

Poka

all that certain piece of Land ~~known~~ known as the Ahupuaa of *Waipunaehi*,
Hilo, in the Island of *Hawaii* and described as follows:

Commencing at a point on the Sea Coast immediately over two large rocks on the beach, one almost out of the water and about square; the second stands in the water shaped thus Δ . A large rock off *Laupahoehoe* and separate from the other rocks, bears North 87° East. The East point of *Kaupo Gape*, on *Maui*, bears North 37° West from this point. The land of *Hakoa* lies on the South side of this land, thence

S. 18° 41' 34" ch. along boundary of *Hakoa* to *Hau Grove*; thence

S. 30° . 40 . thence

. 48 . 70 . to woods; thence

. 40 1/2 . 37 . thence

. 23 1/2 . 35 . to place called *Lookolau*; thence

. 11 1/2 . 20 . thence

. 20 . 38 . to two ohia trees marked X; thence

. 29 . 26 1/2 . thence

. 22 . 27 . to koa tree marked V; thence

. 20 . 42 . to place called *Waipahoehoe*; thence

. 34 . 27 . to mountain corner of *Hakoa*; thence

. 27 . 48 . along boundary of land of *Laupahoehoe* to koa tree marked X; thence

. 26 1/2 . 26 . along *Laupahoehoe* to place called *Kulamihana*; thence

N. 23 . 60 . along land of *Huimihua* to place where three trees stand marked H, K and X; thence

. 29 . 6 . 77 . along *Huimihua*; thence

. 9 . 32 1/2 . 153 . along *Huimihua* and *Kaawali Gulch*; thence

N. 16° E. 112 ch. along Humuula; thence
 . 30° . 115 . along Humuula; thence
 . 26° . 65 . along land of Saana; thence
 . 110° . 91 . along land of Auunai; thence
 . 111° . 111 . along land of Kuuia to a Restau tree marked x; thence
 . 34° . 70 . along land of Keaia and Hapumali Auunai to sea
 coast end

Containing *an area of 2520* Acres,
 more or less; excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every
 description.

To Have and to Hold the above granted Land in Fee Simple, unto the said *John*
his Heirs and Assigns forever,
 subject to the taxes to be from time to time imposed by the Legislative Council, equally upon all Landed
 Property held in Fee Simple.

In Witness Whereof, I have hereunto set my hand, and caused the Great

Seal of the Hawaiian Islands to be affixed, this *fifteenth*
 day of *July*, 187*6*

By the King
The Minister of the Interior
William L. Macdonald

Ahupuaa of Haakoa (no claims).

Ahupuaa of Laupahoehoe (no claims).

Ahupuaa of Kilau (no claims). Awarded in paper to M. Kekauonohi (no record)

Ahupuaa of Puualaea (no claims).

Ahupuaa of Manowaiopae (no claims).

Ahupuaa of Hokumahoe (no claims).

***Ahupuaa of Kihalani — Helu 971
Isaac Harbottle (Native Testimony Volume 3:38)***

Kuapanio sworn: I know the land of Isaac Harbottle at Hilo Paliku, Hawaii. The name of the land is Kihalani. The mountain is in the uplands, and the ocean is on the shore, those are the boundaries that I know. The King [Kamehameha II, in the time of Poki] told me to give this land to I. Harbottle, so I gave it to him. I do not know the boundaries on the Hilo One side, or those on the Hamakua side. Nor do I know of anyone opposing him. [Maly, translator; see also Volume 10:220. Not awarded]

Ahupuaa of Papaaloa (no claims).

***Ahupuaa of Papaaloa — Helu 6608
Pakeokeo (Native Register Volume 5:381)***

(Pakeokeo was a *Konohiki* awardee, and by agreement with the King, was to have received the *ahupua'a* of Papaaloa as a personal land. No record of the award being perfected, or genealogical information is known for him.)

Ahupuaa of Kaiwilahilahi (no claims).

Ahupuaa of Moanalulu (no claims). Awarded in paper to M. Kekauonohi (no record)

***Ahupuaa of Kapehu — Helu 7622
Kauhola¹⁰ (Native Register Volume 5:417)***

To the Commissioner who quiet land claims of the Hawaiian Islands. *Aloha* to you. I am the one whose name is below. I hereby tell you of my land claim on Oahu and also on Hawaii. It is land gotten by my father from Kamehameha I, the King, from traveling to the battle at Nuuanu. When the fight was over, Kamehameha gave the land of Papaakoko at Koolauloa to Kalaau.

Claim 2. Gotten from Kamehameha III, who gave the land to Kalaau. It is Kapehu at Hilo, Hawaii. Those are my claims, given by Kamehameha III, and belonging to me for all time.

¹⁰ *Helu* 2289. Kauhola reported to the Commissioners that his claims were old ones, obtained by his parents, Kalaau (k), and Kamookeawe (w), in the time of Kamehameha I. Kauhola stated that his parents had sailed with Kamehameha to the battle of Nu'uanu, at O'ahu, and when the battle was over, Kamehameha I had given them certain lands. Also following the Battle of Kuamo'o, Kamehameha II had given, Kalaau additional lands (Native Register Volume 3:431-432).

**Ahupuaa of Kapehu — Helu 7622
Kauhola (Native Testimony Volume 10:197 & 338)**

Ahupuaa of Kapehu confirmed and entered into the Book. S.P. Kalama. Feb. 4, 1848.

**Ahupuaa of Kapehu — Helu 2289 (7622)
Kauhola
Mahele Award Book Volume 10:153-154
Royal Patent Book Volume 6:223-224**

Note: While the claim made by Kauhola specifies the *ahupua'a* of Kapehu, subsequent records in the *Mahele Award* and *Royal Patent Books*, identify Kapehu, but provide notes of survey (including a map) for a different location (see *Mahele Award Book* Volume 10:154). The Kapehu identified, appears situated between the *ahupua'a* Kaupakuea, Kaakepa and Neue. Though in Hilo District, outside of the present study area.

Ahupuaa of Keaalau (no claims).

Ahupuaa of Paeohi (no claims).

Ahupuaa of Moanalulu (no claims).

**Ahupuaa of Weloka Helu 11216 (Apana 49)
Mikahela Kekauonohi (a niece of Kamehameha I, granddaughter
of Keouakupuapaikalani)
Native Register Volume 4:362
Native Testimony Volume 10:335**

Awarded in Name (see also *Buke Mahele*).

ROYAL PATENT

Upon Confirmation of the Land Commission.

Makana Hele 11216, Apana 45.

Whereas, The Board of Commissioners to quiet Land Titles have by their decision awarded unto

M. Hekauonohi.

an estate of FREEHOLD less than Allodial, in and to the Land hereafter described, and whereas

proper application having been made to the Minister of the Interior for a Patent on the within described land a certificate of Boundaries defining the same having been duly filed, And whereas the Government commutation thereon was relinquished by resolution of the King Council August 24th 1850.

Therefore, The Government of the Republic of Hawaii Likokalani, By the Grace of God, Queen of the Hawaiian Islands, by this ROYAL PATENT, makes known to all men, that she has for herself, and her successors-in-office this day granted and given absolutely, in Fee Simple, unto

M. Hekauonohi.

all that certain piece of land situate at Mauka Pua, in the District of Hilo in the Island of Hawaii and described as follows:

Beginning at an iron pipe set in the ground on the west bank of the Mokuwai gully, near its mouth, from which point the Hawaiian Govt Survey Δ^{2nd} Station "Lone Hala" bears S. 25° 15' 6" true distant 3772 feet the boundary runs by true bearings:

1. S. 22° 58' N. 2110 feet along Cr. 1032, Kamaijialii, and Cr 2575. Thia, on Weloka to the head of the Mokuwai gully, the boundary line following the middle of the gully to said point.
2. S. 51° 11' N. 3397 ft. along Cr 2575, Thia & the Govt land of Weloka to a concrete block on hill called Maamor, from which point the Hawaiian Govt Survey Δ^{4th} Station "Lui Ohai" bears S. 70° 52' 10" true distant 7212.5 ft.
3. S. 15° 24' N. 2095 ft. along Weloka to concrete block at lower edge of woods.
4. S. 52° 45' N. 1753 ft. along Weloka to Ohia Δ standing at lower edge of ditch.
5. S. 39° 16' N. 1026 ft. along Weloka and Kapahu to an Ohia tree marked Δ on a high point of the Mauka ridge called Kiamaka, said tree bearing from the Hawaiian Govt Survey Δ^{4th} Station "Lui Ohai" S. 62° 45' 50" N. distant 21189 feet.
6. S. 56° 41' N. 11722 feet along Kapahu and Kaimilakilaki to the upper

- end of Maulua ridge at old Kaohale called "Kulijalopula"
7. S. 72°-37' N. 23626 ft along Gov't lands of Hainivilaikalai Or Papua loa, to the North West angle of Mauluanui, at a pile of stones standing a little East of the Lammaia & Hope-a-trails, midway between the same and a Moa-tice marked Δ the Haini Gov't Survey Δ^{2nd} Sta. "Kaiaiki" bearing S. 15°-29' N. true distant 525.7 ft
 8. S. 10°-37' E. 6208 ft along Gov't land of Humuila, to a point on the East or makai edge of the Lammaia & Hope-a-trails, just below an ancient Ahuyma of stones, standing in the middle of the sand flat called Kahuwai, at the base of the Lupaohelo ridge.
 9. N. 75°-05' E. 29931 ft along Gov't land of Ika to a high Knoll called 'Hua' or na Ohia mana mauna distant about 2000 ft West or makai of the crater of 'Mokupunuu' this station being marked by an Ohia tree on which is cut Δ and which bears from the Haini Gov't Survey Δ^{4th} Sta. "Luu Kapele", S. 87°-21' 30" E. true distant 39750.6 feet.
 10. N. 37°-37' E. 16210 ft along Gov't land Lurohau to a natural divide in the Manoloa stream called "Kopuuwai's Manoloa" being the head of the land of Manoloa.
 11. N. 2°-20' N. 3942 ft along head of the Gov't lands of Tohakuloa and Maulua Iki to a point in the Makaliiloa gulch, 150 feet above the Hoowanawana falls.
 12. N. 48°-11' 2" E. 8757 ft along Gov't land Maulua Iki the boundary following the middle of the gulch to the precipice overhanging the Kaiali falls.
 13. N. 32°-53' N. 1250 ft down said falls to junction of Makaliiloa stream with main Maulua stream.
 14. N. 40°-11' E. 3655 ft down middle of Maulua stream and up bank of same to large rock pillar called Tohakuloa at West angle of Section # 3 Gr. 3651. Maulua Iki.
 15. N. 25°-15' E. 710 ft along said Grant to West angle Gr.-----
 16. N. 25°-18' E. 1024 ft along said Grant to flat rock marked Δ at East or makai edge of Gov't road 3. West angle of Sec. 1. Grant 3651.
 17. N. 25°-15' E. 670 ft along Sec. 1. Grant 3651. Maulua Iki to its North angle at high water mark of sea coast, said point bearing N. 11°-29' East true from a large rock called Tohakuloa, distant 84 feet from same. Thence following the windings of the sea coast & at high water mark to the foot of the bank opposite and to the initial point which bears from the last station.
 18. N. 25°-20' N. 1805 ft.
— containing an area of 9255 acres —

~~Containing~~
more or less; excepting and reserving to the Hawaiian Government all mineral or metallic mines of every description.

To Have and to Hold the above granted Land in **FEE SIMPLE**, unto the said

M. Kekauonohi and his

Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council, equally upon all landed Property held in Fee Simple.

In Witness Whereof, ^{the President of the Republic of Hawaii has hereto} I have hereunto set my hand, and caused the Great Seal of the ^{Republic} Hawaiian Islands to be affixed, this 12th day of March, A.D. 1895

by Sanford B. Dole.

President
BY THE QUEEN
J. A. King
Minister of the Interior

Ahupuaa of Humuula – Crown Land (no claims).

Royal Patent Land Grants

Following the *Māhele*, many native tenants remained without personal property though they lived upon, and cultivated lands. The shortcomings of the *Māhele* were recognized as the program was underway, and the King authorized—during the *Māhele*—the issuance of *Palapala Sila Nui* (Royal Patent Grants) to applicants for tracts of land they could use. The parcels were generally larger than those available to native tenants through the Land Commission Awards. Lands available for purchase in this program were limited to those lands which were a part of the Government Land Inventory.

In the Laupāhoehoe vicinity, these lands included the *ahupua'a* of—Ha'akoa (treated as a part of the Government inventory), Laupāhoehoe, Kilaui (treated as a part of the Government inventory), Pu'u 'Ālaea, Manowai'ōpae, Hokumāhoe, Kihalani, Pāpa'aloa (treated as a part of the Government inventory), Kaiwilahilahi, Moanalulu (treated as a part of the Government inventory), Kapehu, Ke'a'alau, Paeohi and Welokā (treated as a part of the Government inventory). The upper section of Humu'ula, which cuts off Laupāhoehoe, was held in lease-hold interests, from the Crown Lands inventory; while the north and south boundary lands of Waipunalei and Maulua nui, were retained as private holdings, and not available to the Royal Patent Land Grant program.

The policy in the Kingdom of providing land grants to native tenants was further clarified in a communication from Interior Department Clerk, A. G. Thurston, on behalf of Keoni Ana (John Young), Minister of the Interior, to J. Fuller, a Government Land Agent on the island of Hawai'i.

The letter reads:

February 23, 1852

...His Highness the Minister of the Interior instructs me to inform you that he has and does hereby appoint you to be Land Agent for the District of Kona, Hawaii. You will entertain no application for the purchase of any lands, without first receiving some part, say a fourth or fifth of the price; then the terms of sale being agreed upon between yourself and the applicant, you will survey the land, and send the survey, with your report upon the same to this office, for the Approval of the Board of Finance, when your sales have been approved you will collect the balance due of the price; upon the receipt of which at this office, the Patent will be forwarded to you.

Natives who have no claims before the Land Commission have no Legal rights in the soil.

They are therefore to be allowed the first chance to purchase their homesteads. Those who neglect or refuse to do this, must remain dependant upon the mercy of whoever purchases the land: as those natives now are, who having no kuleanas are living on lands already Patented, or belonging to Konohikis.

Where lands have been granted, but not yet Patented, the natives living on the land are to have the option of buying their homesteads, and then the grant be located, provided this can be done so as not to interfere with them.

No Fish Ponds are to be sold, neither any landing places.

As a general thing you will charge the natives but 50 cents pr. acre, not exceeding 50 acres to any one individual.

Whenever about to survey land adjoining that of private individuals, notice must be given them or their agents to be present and point out their boundaries... [Interior Department Letter Book 3:210-211]

In between 1852 to 1916, sixty-five applications were awarded for a land area totaling approximately 2,504 acres. *Table 2* is a list of the applicants and particulars pertaining to the grants issued, given by *ahupua'a* name and in numerical order of the *Helu* or Grant Number. Most of the early grants, issued from 1852 to the 1860s, were issued to native Hawaiian residents of the area, who had not applied for *kuleana* lands as a part of the *Māhele*. Several early grants, along with the later grants of the 1890s to 1916, were to individuals (both Hawaiian and non-Hawaiian) who were cultivating sugar cane as a part of the expanding Laupahoehoe Sugar Company venture. Register Map No. 1859 (S.M. Kananui, Surveyor, 1896 – with annotations to include the Laupāhoehoe Homestead Lots), depicts the location of the Grants cited in *Table 2*. All the parcels occur below the 2,000 foot elevation.

Table 2. Grantees of Lands in the Laupāhoehoe Vicinity (Ha'akoa to Welokā)

<i>Helu</i>	<i>Book</i>	<i>Grantee</i>	<i>Land Area</i>	<i>Acres</i>	<i>Year</i>
3172	15	Thomas Spencer, Jr.	Haakoa	68.10	1877
884	4	Jno. Van Houten (Cancelled)	Laupahoehoe	227.48	1852
885	4	Kahawai & Kaheana	Laupahoehoe	4.65	1852
886	4	Waiwaiole	Laupahoehoe	2.05	1852
887	4	Kuhoupio, et al.	Laupahoehoe	95.00	1852
888	4	Paapu	Laupahoehoe	0.75	1852
889	4	Moku & Mohaiula	Laupahoehoe	6.54	1852

Table 2. Grantees of Lands in the Laupāhoehoe Vicinity (Ha‘akoa to Welokā) (continued)

<i>Helu</i>	<i>Book</i>	<i>Grantee</i>	<i>Land Area</i>	<i>Acres</i>	<i>Year</i>
890	4	Keawekane & Kuana	Laupahoehoe	1.43	1852
891	4	Palea & Kualii	Laupahoehoe	7.40	1852
892	4	Koko & Kaaua	Laupahoehoe	6.80	1852
1062	6	Kaolulo	Laupahoehoe	14.15	1852
1064	6	Kahoapiliwale	Laupahoehoe	36.12	1852
1065	6	Kaili (Cancelled)	Laupahoehoe	17.50	1852
1066	6	Mohaiula & Moku	Laupahoehoe	30.50	1852
1067	6	Mahoe	Laupahoehoe	11.30	1852
1068	6	Waiwaiole	Laupahoehoe	22.60	1852
1069	6	Kamauna	Laupahoehoe	2.20	1852
1960	10	Maele	Laupahoehoe	18.12	1856
1963	10	Jno. Van Houten	Laupahoehoe	4.33	1856
2889	14	Keaweaimoku	Laupahoehoe	17.50	1862
3574	18	E.W. Barnard	Laupahoehoe	50.00	1891
3711	18	E.W. Barnard	Laupahoehoe	61.65	1894
4135	20	J.C. Strow	Laupahoehoe	92.30	1898
4146	20	F. Licente	Laupahoehoe	19.90	1898
4147	20	Antonia Moniz	Laupahoehoe	12.40	1898
4148	20	Okamura	Laupahoehoe	20.70	1898
4160	20	E.W. Barnard	Laupahoehoe	81.10	1898
4161	20	George Kittel	Laupahoehoe	24.80	1898
4178	20	C.E. Steel	Laupahoehoe	104.20	1898
5054	24	E.W. Barnard	Laupahoehoe	5.20	1907
5600	25	Anna Reinhardt	Laupahoehoe	71.74	1911
5706	27	Florence Rickard	Laupahoehoe	30.53	1912
5849	27	Caroline Swain	Laupahoehoe	26.51	1913
5907	27	Annie Rickard	Laupahoehoe	14.55	1913
6196	29	Trustees, Hawaiian Protestant Church	Laupahoehoe	24,690 sq. ft.	1914
4116	20	Robt. Low	Kiilau (Kilau)	49.37	1898
3631	18	Mrs. A. Lidgate	Pualaea (Puualaea)	20.50	1893
5635	26	Papaaloa Agri. Co.	Puualaea	6.10	1912
907	4	Makaikuha, et al.	Kihalani	47.20	1852
4333	21	D.K. Makuakane	Kihalani	68.00	1899
5601	26	Jas. Mattoon	Kihalani	0.75	1911
6230	29	Manuel Silva	Kihalani	12.06	1914
6231	29	Joseph Ignacio	Kihalani	11.16	1914
6237	29	Elias K. Kaiwa	Kihalani	8.08	1914
6238	29	John K. Kalamau	Kihalani	10.32	1914
6239	29	Annie Simmons	Kihalani	10.20	1914
6240	29	Louisa Passos	Kihalani	10.00	1914
6241	29	James Mattoon, Sr.	Kihalani	9.49	1914
6371	30	Kameichi Yoshino	Kihalani	10.84	1915
6396	31	Tsukino Perada	Kihalani	11.57	1915
6481	31	Maria Nahakuelua	Kihalani	11.00	1915
6522	31	Manuel Paulos, Jr.	Kihalani	11.06	1916
904	4	Kapule & Nawahine	Papaaloa	104.90	1852
908	4	Kapalehua	Papaaloa	72.50	1852
4284	21	W.G. Singlehurst	Papaaloa	39.70	1899
4295	21	Robt. Lillie	Papaaloa	62.40	1899
906	4	Kauwiwi, et al.	Kaiwilahilahi	141.80	1852

Table 2. Grantees of Lands in the Laupāhoehoe Vicinity (Ha‘akoa to Welokā) (continued)

<i>Helu</i>	<i>Book</i>	<i>Grantee</i>	<i>Land Area</i>	<i>Acres</i>	<i>Year</i>
2729	13	Keoki & 3 others	Kaiwilahilahi	160.00	1860
4287	21	Geo. H. Angus	Kaiwilahilahi	95.70	1899
2220	12	Kananu	Moanalulu	81.00	1857
4286	21	F.M. Swanzy	Moanalulu	96.70	1899
4283	21	J.S. Low	Kapehu	72.70	1899
4332	21	A. Cockburn	Kapehu 2	62.70	1899
2761	13	Iokia	Paehoi	50.00	1861
1032	6	Kamaipiialii	Weloka	62.50	1852
2572	13	Kua	Weloka	52.00	1859
4285	21	J.C. Cook	Weloka	57.60	1899

Land Use and Development of the Laupāhoehoe Sugar Company (1876-1992)

As described in several early historical accounts, dating from 1823 to the 1840s (in this study), western-associated land use practices focused primarily on hunting bullocks along the upper forest edge, and the harvesting of *koa* and *‘ōhi‘a* for lumber. The historical records also provides us with brief accounts of on-going traditional practices such as the collection of bird feathers. We also find references to historic period, hunting of *kōloa* (native ducks) and *nēnē* (native geese) at one of several places along the forest line called “Waikoloa” (in this case translated as Duck-ponds), and accounts of the collection of *kōlea* (*Myrsine*) tree bark for use in the tanning of bullock hides. While we have cited several accounts of travel through the Laupāhoehoe forest region, it is not until the 1850s, that we found the first references of western business interests on the landscape.

The earliest conveyances found and recorded for land at Laupāhoehoe, dates from 1857, in which John V. Houten transferred interest in his Royal Patent Grant Land (No. 1963), in the amount of four and one-third acres, to Robert Robinson (Bur. of Conveyance, Lib. 9:529-530). A few months later, Robinson conveyed the same parcel to Benjamin Pitman of Hilo (married to a Hawaiian woman of high-chiefly rank), who was developing a sugar plantation at Ponahawai, Hilo (Bur. of Conveyances, Lib. 9:530-531). The Laupāhoehoe parcel was situated on the peninsula, and would play a part in the later development of the Laupāhoehoe Sugar Company and Mill operations.

In 1859, Abel Harris and F.B. Swain entered into a partnership and secured a section of land at Laupāhoehoe (on the peninsula and lower plains), from which they ran a trading station, and attempted to undertake several business ventures, including, collection of *pulu* (down) from *hāpu‘u* (*Cibotium*) tree ferns, hunting bullocks in the upper forest lands, and cultivation of sugar cane on the lowlands. Harris resided at Laupāhoehoe as well, and with Swain, also entered into an agreement to lease Humu‘ula—the lands extending from the shore, through the forest zone.

The upper lands of Humu‘ula—those cutting off the Laupāhoehoe vicinity forest boundary—had previously been granted in lease to Frances Spencer, who ran a bullock hunting and sheep ranching operation in the upper mountain region.

November 11, 1859

Kamehameha IV to Harris & Swain

(Five year lease of Humuula to upper forest region, withholding right to take wild cattle; lowlands used in development of plantation interests):

This Indenture made this 11th day of November AD 1859, between His Majesty Kamehameha IV, King of the Hawaiian Islands of the one part and Abel Harris & F.B.

Swain of Honolulu and *Laupahoehoe* of the other part. Witnesseth that for and in consideration of the Rent & Covenants on the lessees part herein after recorded & contained, he the said Kamehameha IV hath demised and leased & by these presents doth demise & lease unto the said Abel Harris and F.B. Swain, their heirs, executors, assigns, all that part of the land of Humuula in the District of Hilo, Island of Hawaii – Lying between the Sea & the *mauka* edge of the dense forest — excepting only from the Lease Kuleanas awarded by the Land Commissioners & *reserving the right of catching & converting the wild Mountain Cattle that may be running in the forests*, with all the rights, members, easements, appurtenances thereunto belonging for & during the term Five Years to commence from the 11th day of November, AD, one thousand eight hundred & fifty nine yielding & paying therefore unto the said Kamehameha IV his heirs, co assigns the yearly rent of Two Hundred Dollars to be paid in half yearly installments, one hundred dollars each at the end of each half year of the said term, over & above all taxes, charges & assessments to be levied as imposed thereon... ..& that *the said Abel Harris & F.B. Swain shall not commit or knowingly permit or suffer any waste to be done up the said demised premises, or cut down or permit to be cut down any forest trees on said land...* [Bur. of Conveyances Lib. 12:351-352]

In 1860, Benjamin Pitman conveyed to Abel Harris, the four and one-third acre parcel on Laupāhoehoe Peninsula (Grant No. 1963), and Harris in turn assigned the parcel to Charles N. Spencer in 1861 (Bur. of Conveyances, Lib. 18:146-147). As described in the deed, the land had been used as a “Trading Station” and place of residence by Harris. Harris and Swain ran into financial difficulties, and the transfer of Laupāhoehoe and other interests, was described in the following conveyance:

...The lot occupied by me at Laupahoehoe, Hilo, Hawaii, on which are situated a store house and dwelling heretofore occupied by me as a place of residence & trading station, together with all the structures & appurtenances thereto belonging, together with all the buildings situated on Laupahoehoe to me belonging, together with all Leases of lands on the islands of Hawaii and Oahu... Said land at Laupahoehoe having been conveyed to me by Benj. Pitman, Esqr., by Deed dated the ninth day of July 1860 & and the several leases hereby referenced included in a Schedule hereunto annexed which I have directed to be signed by James C. King [July 13, 1861. Bur. of Conveyances, Lib. 14:223-225]

In 1865, the *ahupua‘a* of Waipunalei, which forms the northern boundary of Laupāhoehoe Ahupua‘a, through the upper forest zone, and which was awarded to Poka in the *Māhele (Helu 4675)*, was sold to Charles N. Spencer, by the widow of Poka (Bur. of Conveyances, Lib. 20:321-322). Spencer’s activities at the time, included extensive ranching operations in Ka‘ū.

On July 20th, 1868, David Manu, Government Land Agent in the District of Hilo, granted a five year lease of all government lands, extending from the *pali* of Laupāhoehoe, north, to the land of Kahoahuna, along the *pali* of Kaawali‘i, to Thomas Spencer. The terms of the lease was five years, at a rate of \$50.00 per year (Bur. of Conveyances, Lib. 26:324). Spencer, as with other members of his family, was involved in ranching and early efforts at development of plantation interests. In addition to the lease of 1868, Spencer had acquired several parcels of land in Laupāhoehoe, Ha‘akoa and Waipunalei—described in Royal Patent Grants No. 1963, 3172 and 6798, containing approximately 2,592 acres.

It was apparently not until 1876, that a large-scale business endeavor in Laupāhoehoe and vicinity became a viable undertaking. In January 1876, The Kingdom of Hawai‘i, through the Minister of the Interior, granted a lease of the government lands of Laupāhoehoe (1 & 2), Kiilua (1 & 2) and Pu‘u ‘Alaea to William Lidgate. This lease enabled the establishment of a sugar plantation, that became Laupahoehoe Sugar Company in 1883, and which came to embrace thousands of acres in adjoining lands as well.

In 1876, Lidgate and Thomas Campbell entered into an agreement—Lidgate was to plant the sugar cane, and Campbell was to build the mill. The mill was built on the Laupāhoehoe Peninsula (near the Kilau stream mouth), and the cane planted on the lower plains, above the cliffs, cleared of forest growth. It was further agreed that within the first ten years of business, enough land would be cultivated so as to yield 400 tons of cane for processing. In 1879, Campbell sold his interest in the mill operation to Theo H. Davies, and in 1883, Davies came to control the entire operation, which was named Laupahoehoe Sugar Company (LSC). By the early 1900s, the LSC fields extended approximately 10 miles along the Hilo coast, including both fee-simple and leasehold lands, extending from the ocean cliffs, to approximately 1,850 feet above sea level. The plantation fields crossed some 22 gulches of the Hilo District. The cane transported through a system of flumes, and in the Maulua section, by a steam hoist that lifted cane-loaded cars 1,100 feet by cable to the top of the gulch.

Early documentation of the Laupāhoehoe venture was recorded as a part of the conveyances of lands which came to make up the plantations' interests. These records—from the collection of the Bureau of Conveyances—include descriptions of the land, and limited stipulations pertaining to protection of the forest lands.

January 17, 1876

***W.L. Moehonua, Minister of Interior; to William Lidgate
Lease***

This Indenture made this Seventeenth day of January A.D. 1876 between His Excellency W.L. Moehonua His Hawaiian Majesty's Minister of the Interior, for and in behalf of the Hawaiian Government of the first part, and William Lidgate of Hilo, Island of Hawaii, one of the Hawaiian Islands, of the second part; Witnesseth, That for and in consideration of the rents, covenants and agreements hereinafter reserved and contained, on the part and behalf of the said party of the second part his executors, administrators and assigns, to be paid, kept and performed, he the said party of the first part, hath demised and leased, and by these presents doth demise and lease unto the said party of the second part, his executors, administrators and assigns all those tracks or parcels of Land situate in the district of Hilo, Island of Hawaii, No. 1 known as Laupahoehoe Nos. 1 & 2, Kilau, Nos. 1 & 2, and Pualaea making in all Five (5) lands.

To have and to hold, all and singular, the said premises above mentioned and described, with the appurtenances thereunto belonging unto the said party of the second part, his executors, administrators and assigns, for and during the term of Fifteen (15) years, to commence from the First day of January A.D. 1876. The said party of the second part his executors, administrators and assigns yielding and paying therefore from and immediately after the commencement of the said term, and during the continuance thereof, unto the said party of the first part, and his successors in office, the annual rent of Two hundred (\$200.) dollars, over and above all taxes, charges and assignments to be levied or imposed thereon by Legislative Authority...

...That he the said party of the second part... *...shall not, nor will at any time during the term hereby granted, do or commit, experiment or suffer to be done, any willful or voluntary waste, spoil or destruction, in and upon the demised premises, or any part thereof, or cut down, or permit to be cut down any trees, now growing or being, or which shall hereafter grow or be in and upon the above demised premises, or any part thereof. Except so much as may be necessary for fuel and for building fences or other structures on the property hereby leased,* and will, at the end or other sooner determination of the said term hereby granted, peaceably and quietly leave and yield up unto the said party of the first part, or his successors in office, all and singular the premises hereby demised, with all erections, buildings and improvements of whatever name or nature, now on or which may be hereafter put, set up, erected and placed upon the same, in as good order

and condition in all respects, (reasonable use, wear and tear excepted) as the same are at present or may hereafter be put by the said party of the second part his executors, administrators or assigns... [Bur. of Conveyances, Lib. 97:147-149]

In September 1876, Lidgate entered into an agreement with Thomas Campbell, by which Campbell became a partner in the sugar plantation. Lidgate would grow the sugar cane, and Campbell would build the mill for processing the cane into sugar. Thus was formed the Lidgate and Campbell Sugar Company, forerunner of the Laupahoehoe Sugar Company. The agreement was recorded in the Bureau of Conveyances:

September 30, 1876
William Lidgate; to Thomas Campbell
Lease & Agreement

This Indenture of Agreement made this 30th day of September, A.D. 1876, by and between William Lidgate of Hilo, Hawaii of the first part, and Thomas Campbell of Honolulu of the second part. Witnesseth. That whereas the said party of the first part has leased from the Minister of the Interior by deed dated January 17th, 1876, certain tracts of land at and near Laupahoehoe, Hawaii for the purpose of a sugar plantation and in consideration of the covenants of the party of the second part hereinafter contained, the party of the first part, doth hereby covenant and agree to give grant and lease – rent free, unto the party of the second part, his heirs and assigns for a period of ten years from January 1, 1878, a piece of land near the sea, to be mutually agreed upon suitable for a mill site, also, sufficient land for a dwelling house, and native or labourers quarters to be erected by and for the use of the party of the second part; also for the same term of ten years from January 1st, 1878 sufficient land to enable the said party of the second part to plant fifty acres of sugar cane in each year, with rights to cultivate and take off both plant and first ratoon crops from said land. *Also the party of the first part, doth hereby grant unto the said party of the second part the right to cut and carry all the wood (on the lands leased by the party of the first part) that he may require for fencing or fuel to be used on the said land. And the party of the first part doth further covenant and agree to plant in the year 1877 and in each subsequent year for ten years, sufficient cane to yield 400, viz. four hundred tons of Sugar from plant cane in each year (viz. four hundred tons) and to deliver the whole of the cane planted on said land together with the ratoons at the Sugar Works of the party of the second part for manufacture into Sugar.* The party of the first part further undertakes to give to the party of the second part during the term of this agreement the free use of whatever water he may require for mill, cattle and domestic purposes, and the right to pasture thirty head of cattle or horses on equal terms and conditions as the cattle of the party of the first part are pastured. In consideration whereof the party of the second part hereby covenants and agrees that he will erect on the mill site aforesaid during the year 1877 sugar works sufficient to take off Four tons of Sugar per day, that he will grind and manufacture into sugar all the cane delivered at the said works by the party of the first part and pack the products in sufficient packages to be furnished jointly by the parties hereto. The cane of the party of the first part shall be ground in preference to any other cane, except that after four hundred and fifty tons of Sugar shall have been ground for the party of the first part, in any one year the party of the second part may grind the whole of his own cane, before grinding the remainder of the crop belonging to the party of the first part. All the Sugar and Molasses from the cane of the party of the first part shall be consigned to Theo. H. Davies or his representative at Honolulu for sale, and the net proceeds after deducting interest, commission and all other charges, shall be divided equally between the parties hereto. At the expiration of the above term of ten years, the party of the second part shall sell to the party of the first part at a valuation to be made by persons mutually selected, the whole of the works and premises and crops, that shall have been erected and produced in accordance with this

agreement. And for the proper fulfillment of this agreement the parties hereto bind themselves, their heirs and assigns each to the other his heirs and assigns. In testimony whereof we hereunto affix our signatures the day and year above written... [Bur. of Conveyances, Lib. 44:267-269]

In 1878, Thomas Spencer entered into a lease agreement, conveying his interests in Laupāhoehoe, Ha'akoa, and Waipunalei, to George Pope. The lease includes reference to rights to take wood from the forests, and the pasturing of cattle on the land, and the cultivation of sugar cane on those neighboring lands, not leased to, or purchased by William Lidgate.

May 27th, 1878

Thomas Spencer; to George Pope

Lease of lands at Laupāhoehoe, Ha'akoa (Hakoa) and Waipunalei for development of a Sugar Plantation:

[Thomas Spencer lease to George Pope:] ...all those several pieces of land known as Laupahoehoe, Waipunalei and Hakoa situate on the Island of Hawaii and described in Royal Patents Numbers respectively 1963, 3172 and 6798 and containing by measurement Two Thousand Five Hundred and Ninety Two Acres or thereabouts... Together with all buildings and improvements there on, and all rights, easements and appurtenances thereunto belong. To hold the same... for the term of twelve years...the yearly rent of Seven Hundred Dollars...

The said George Pope... shall and will keep in repair the buildings now on Laupahoehoe and surrender the same in like condition and repair as the same may be in at the commencement of the said term; and it is hereby declared and agreed that the said George Pope...shall have the right to cut wood growing upon the said lands for use for firewood, fencing and other purposes in the said lands, and shall be entitled to remove all buildings and machinery which may be erected during the said term upon the said lands for the purposes of the plantation at the expiration of the said term unless the said Thomas Spencer...shall elect to take the same at a valuation to be then made, and that the said party of the first part [T. Spencer], shall have the right to depasture all cattle belonging to his said ward [Thomas Spencer, Jr.], on such parts of the said lands as may be unenclosed and uncultivated and to cut and carry away wood there from for all purposes... [Bur. of Conveyances, Lib. 56:25-26]

In February 1879, George Pope, sold a portion of his lease-hold interest—that acquired from Thomas Spencer—to William Lidgate. Popes' short lived "Waipunalei Plantation," including "all the implements, tools, provisions and livestock" (Bur. of Conveyances, Lib. 60:8-9). Upon giving up his interest in the Laupāhoehoe, Ha'akoa and Waipunalei lease-hold lands, Pope entered into a leasehold agreement with S.L. Wilder, Minister of the Interior (Lease No. 261), to lease all the government lands situated between Waipunalei and Humu'ula, up through the forest zone. The total area conveyed as a part of the lease, contained 975 acres, but the agreement contains a note that a competing claim for a portion of the land was being made by John Coney. The lease agreement included requirements that the trees upon the land not be cut or damaged (Bur. of Conveyances, Lib. 60:9-13).

Thus Lidgate came to hold the primary sugar plantation interests in the Laupāhoehoe vicinity. Later in 1879, Campbell sold his interests in the Laupāhoehoe plantation to Theo H. Davies, as recorded in the following conveyance:

September 30, 1879
Thomas Campbell; to Theo H. Davies
Bill of Sale

Know all men by these presents that I, Thomas Campbell of Laupahoehoe in the Island of Hawaii for and in consideration of the sum of Twenty Thousand (\$20,000) Dollars to me in hand paid by Theo H. Davies of Honolulu in the island of Oahu, the receipt whereof is hereby acknowledged, have granted, bargained and sold and by these presents do grant, bargain and sell unto the said Theo H. Davies and to his executors, administrators and assigns all and singular the Mill Machinery, centrifugals and all other fixtures belonging to and comprising and forming the Laupahoehoe Sugar Mill as the same now stands at said Laupahoehoe – and for the consideration aforesaid the said Thomas Campbell does sell, transfer and assign unto the said Theo H. Davies all his right, title and interest of, in and to the mill site of said Laupahoehoe Sugar Mill and all land and ground used in connection with and forming part of the site of said Mill, together with the contract made with William Lidgate for grinding cane grown by him and all benefit and advantage thereof. To have and to hold the same unto the said Theo H. Davies and his executors, administrators and assigns forever and the said Thomas Campbell for himself and his heirs, executors and administrators does hereby covenant to and with the said Theo H. Davies and his heirs executors administrators and assigns that he has good right and title to sell the above described premises & Machinery comprising and forming his said Sugar Mill and that he or they shall and will warrant and depend the same against the claims and demands of all persons – and for the consideration above set forth the said Theo H. Davies does hereby release and discharge the said Thomas Campbell of and from any and all indebtedness now or heretofore existing and due on to become due by the said Thomas Campbell to the said Theo H. Davies by or on account of any dealings had by and between them. In witness whereof the said Thomas Campbell and the said Theo H. Davies have hereto set their hands and affix their seals this thirtieth day of September, A.D. 1879 [Bur. of Conveyances Lib. 64:194-195]

In 1879, William L. Green entered into legal action against George Pope and William Lidgate, and in settlement, secured the Laupāhoehoe vicinity lands—both fee-simple and leasehold interests (Bur. of Conveyances, Lib. 60:248-250). Green subsequently assigned the lease-hold interests to Robert Hind in 1880:

April 13, 1880
W.L. Green to R.R. Hind
Assignment of Lease

This Indenture made this 13th day of April, 1880 by & between Wm L. Green of Honolulu, Island of Oahu of the first part & Robert R. Hind of North Kohala, Island of Hawaii of the second part. Witnesseth. That said party of the first part for & in consideration of the sum of Twelve thousand Dollars, (\$12,000) to him paid by said party of the second part by note of even date herewith the receipt whereof is acknowledged doth hereby grant, bargain, sell, assign, transfer, set over & deliver unto said party of the second part his executors, administrators & assigns all of the right, title & interest of him said party of the first part in & to those two certain indentures of Lease & the lands, premises & hereditaments therein & thereby demised, more particularly described thus: 1st Lease of Thomas Spencer of Hilo as Guardian of the property of Thos Spencer Jr. to George Pope dated the 16th day of May, 1878 recorded Liber 56 page 25 of the lands known as Laupahoehoe, Waipunalei & Haakoa on Hawaii containing about 2592 Acres for the term of 12 years from the 1st day of August 1878 & 2nd Lease of Saml. G. Wilder as Minister of the Interior, to said George Pope dated the 30th day of Feby. 1879 recorded in Liber 60

page 9 of the entire set of lands lying between Humuula & said Waipunalei more particularly set forth & described in said lease & comprising about 975 Acres for the term of ten years from said date. Said conveyances of lease having been assigned to the said party of the first part hereto by assignment of George Pope dated the 28th day of April 1879 recorded Liber 60 page 248 & release of Wm Lidgate dated 1st May 1879 recorded Liber 60 page 250. To have & to hold said leases & the premises therein & thereby demised unto said party of the second part his executors, administrators & assigns for & during the rest, residue & remainder of the terms of said leases. Subject nevertheless to the payment of the rents therein & thereby reserved & to the due performance of the covenants & conditions therein set forth. And the said party of the second part for himself, his heirs, executors, administrators and assigns hereby covenants & agrees to & with said party of the first part his heirs & assigns that he or they shall and will pay the rents upon said premises from the date of last payment thereof & thereafter to accrue during said terms & also to do & perform all of the other covenants & conditions therein set forth & thereby save harmless the said party of the first part hereto & also that the said party of the first part his heirs, his executors, administrators & assigns shall be & are hereby released from all liability present or prospective by reason of any rights of one J. H. Coney in any or all of the lands demised by said lease of the Minister of the Interior. In witness whereof said Wm L. Green of the first part & Robert R. Hind of the second part have hereunto set their respective hands & seals the day & year first above written. [Bur. of Conveyances, Lib. 63:447-448]

Though there had been financial difficulties, William Lidgate remained at the Laupāhoehoe plantation, and in 1881, William Lidgate and Anthony Lidgate, entered into an agreement by which an additional 675 acres of sugar cane would be planted within five years. The lands would be made available from the lower Government Road to the uplands, running between gulches. By this record, we find that the flume system for transporting harvested cane was already in use, and that lands of Moanalulu and Kaiwilahilahi were also to be cleared for planting by 1883.

June 30, 1881

**A. Lidgate & Co. to Wm. Lidgate & Co.
Agreement**

This agreement made and entered into this 30th day of June A.D. 1881. Witnesseth, that Anthony Lidgate and Rederick McKenzie both of Laupahoehoe, Hilo, District, Hawaii. (constituting the firm of A. Lidgate & Co.) of the first part, and Wm Lidgate of same place, and Theo H. Davies of Honolulu, Island of Oahu, (constituting the firm of Wm Lidgate & Co.) of the second part. Do hereby contract and agree to the following terms and conditions to wit. The said parties of the first part do hereby contract and agree and by these presents bind themselves to plant not less than (75) Seventy-five acres of cane, during the first one half of the year 1882. One hundred and fifty (150) acres, during the first one half of the year 1883. One hundred and fifty (150) acres, during the first one half of the year 1884. One hundred and fifty (150) acres, during the first one half of the year 1885 and one hundred and fifty (150) acres, during the first one half of the year 1886, and each year as said cane shall mature to cut and deliver said canes to the Sugar Mill and Works of said parties of the second part, situate in Laupahoehoe, District of Hilo, Island of Hawaii, and said canes then to be ground and manufactured into sugar by and at the expense of said parties of the second part.

And the parties of the second part do further more agree and by these presents bind themselves to furnish all lands necessary for the planting of said canes as hereinbefore specified, free of rent until such time as then first crop of ratoons of each separate plant shall have come to maturity and no longer, and been ground, said lands to commence at the Government Road on the *makai* side and run *mauka* or towards the mountain in as

nearly a uniform width as possible by occupying the land from gulch to gulch. And the parties of the second part do furthermore agree and bind themselves to manufacture said canes into sugar with good and sufficient machinery. And that said Sugars shall be shipped to a market by said parties of the second part, and then sold to the best advantage and one half (1/2) of the net proceeds of such sales to be paid to the said parties of the first part. And further more the parties of the second part do hereby agree to allow the parties of the second part to ratoon said plant cane lands once, and further more to allow them to ratoon their last crop during the year of 1887. And the parties of the second part do furthermore agree to furnish to the parties of the first part money to exceed the sum of One hundred (100) Dollars per acre each year as advance the interest on said moneys advanced to be at the same rate to as said parties of the second part themselves pay said advances to be deducted from the net proceeds of the one half of the Sugar of the parties of the first part and paid to the parties of the second part.

And further more (as some of the canes may be below the flume of the parties of the second part). The parties of the second part hereby agree to transport said canes from a point in the lower end of fields and to deliver the same in the flumes above. Also to construct a flume to the lower or *makai* side of said canes planted by said parties of the first part as per annexed diagram commencing at the Mill and running to lower end of cane field of the parties of the first part. It is also further more mutually agreed that all canes planted during the year of 1882, shall be planted on the lands known as Kaiwilahilahi, and that of the year 1883 on the lands known as Maunalulu [Moanalulu] and said parties of the second part agree to notify said parties of the first part one year in advance when said parties of the first part are to plant for the following year. And the parties of the second part agree to manufacture said canes on coming to maturity in quantities not less than fifty (50) tons at any one time. [Bur. of Conveyances, Lib. 68:494-495]

In 1883, the Lidgate operations were reorganized, and Theo H. Davies held the principal shares of the company. The operation was renamed, Laupahoehoe Sugar Company, and in October 1883, the interests acquired Government Lease No. 353, bringing portions of the lands of Kapehu, Welokā and Pāpa‘āloa, into the operation. As was the case with earlier agreements, stipulations pertaining to limited protection of the forest resources were made a part of the lease—with trees only to be used for plantation purposes (e.g. fuel and construction). Following incorporation of the Pāpa‘āloa lands into the Laupahoehoe Sugar Company leases, the Laupāhoehoe Mill was relocated from the peninsula, to the coastal cliffs of Pāpa‘āloa.

October 15, 1883
Minister of Interior to Laupahoehoe Sugar Co.
Government Lease No. 353

This Indenture made this 15th day of October A.D. 1883. Between His Excellency Chas T. Gulick, His Hawaiian Majesty's Minister of the Interior, for and in behalf of the Hawaiian Government of the first part, and Laupahoehoe Sugar Company of the second part; Witnesseth. That for and in consideration of the rents, covenants and agreements hereinafter reserved and contained, on the part and behalf of the said parties of the second part, their executors, administrators and assigns to be paid, kept and performed, by the said party of the first part, hath demised and leased, and by these presents doth demise and lease unto the said parties of the second part, their executors, administrators and assigns. All that tract of Government land known as Kapehu, Hilo, Hawaii being bounded [Liber 97:143] and described as follows: Beginning at a point on the boundary of Maulea [Maulua] and Weloka at the South corner of Grant 2575 (Kua) said point being South 52° W (true) 3160 feet from the front of the falls on the Coast that mark the North

angle of Maulua and running thence S. 52 W. (true) 7400 ft. along Maulua. Thence No. 48° W. (true) along Government reserved forest land 7000 feet more or less till the line strikes the middle of the gulch dividing Kaiwilahilahi from Papaaloo. Thence down middle of said Gulch along the Papaaloo lease to the point known as "Geo. Kipi's cut off" the general course and distance being N. 45° 30' E. (true) 4800 feet. Thence down the Moanalulu boundary about 3000 feet to the South corner of Grant 2220. Thence along the boundaries of Grants No. 2220, 2393, 1033, 2002, 2761 and 2575 as described in said Grant to point of beginning and including an area of 1250 Acres more or less.

To have and to hold all and singular, the said premises above mentioned and described with the appurtenances thereunto belonging unto the said parties of the second part, their executors, administrators and assigns, for and during the term of Fifteen (15) years to commence from the 15th day of October A.D. 1883 [Bur. of Conveyances, Lib. 97:144]...

...and also that they the said parties of the second part, their executors, administrators and assigns, shall not, nor will at any time during the term hereby granted, do or commit, or permit or suffer to be done, any willful or voluntary waste, spoil or destruction, in and upon the above demised premises, or any part thereof, or cut down, or permit to be cut down, any trees now growing or being or which shall hereafter grow, or be in and upon the above demised premises, or any part thereof; and will, at the end, or other sooner determination of the said term hereby granted, peaceably and quietly leave and yield up unto the said party of the first part, or his successors in office, all and singular the premises hereby demised with all erections, buildings and improvements of whatever name or nature now on or which may be hereafter put, set up, erected and placed upon the same in as good order and condition in all respects (reasonable [Liber 97:145] use, wear and tear excepted) as the same are at present or may hereafter be put by the said parties of the second part... [Bur. of Conveyances, Lib. 97:146]

A manuscript in the collection of the Hawaii Sugar Planters Association collection (ms. Susan Campbell, Archivist), notes that the Laupāhoehoe operations continued to expand through the early 1900s.

J.M. Lydgate, who managed the operation from 1880 to 1888 is reported to have used contour plowing and planting techniques, in an effort to reduce erosion on the uneven terrain. He also introduced the practice of planting fallow fields in blue lupine for erosion control, which was then plowed under to mulch fields in preparation for new plantings.

In 1909 and again in 1914, an area of 1,310 acres, situated below the forest line, was set aside for homesteads under the Territorial Homesteading Act. The homesteaders grew cane under contract which they sold to Laupāhoehoe Sugar Company. As was the case in other localities where homesteaders entered into planting agreements, the program met with mixed results, but by 1918, the lands produced an annual yield of 12,000 tons of sugar.

Campbell noted that the plantation had model plantation camps, with houses surrounded by garden space, and playgrounds and concrete bath houses. By 1918, twelve plantation camps housed the 900 laborers employed by Laupāhoehoe Sugar Company. Campbell also reported that because of the numerous gulches in the Laupāhoehoe section, flumes were extensively used to transport the harvested cane to the mill. In 1922, a new high lift pump was installed to move two million gallons of water a day out of Kaawalii Gulch up to the head of the main flume at the 750 foot elevation. The main flume carried 30 tons of cane per hour to the mill. Laupāhoehoe Sugar Company was reportedly the first plantation in Hawaii to lift water for fluming as high as 750 feet (ms. Campbell).

By 1937 some 6,400 acres of sugar cane was planted on the Laupāhoehoe lands, and a total of 881 people worked on the plantation (ms. Campbell). As the economy shifted, and plantation operations became more expensive, Laupāhoehoe Sugar Company merged with Kaiwiki Sugar Company, and later with Honoka'a Sugar Company. While Laupāhoehoe Sugar Company ceased to exist in 1979, operations were continued until 1992, when the Honoka'a operation filed for bankruptcy (Dorrance, 2000).

The Laupāhoehoe Homesteads (1904-1914)

In the 1880s, the Hawaiian Kingdom undertook a program to form Homestead lots on Government lands—a primary goal being to get more Hawaiian tenants in possession of fee-simple property (Homestead Act of 1884). On Hawai'i, Government lands around the island were set aside for homesteading purposes. Several of the lands in the Laupāhoehoe vicinity were not available for the program, as they had been leased out to the Laupāhoehoe Sugar Company.

In 1895, following the overthrow of the Hawaiian Monarchy, the Provisional Government of the Republic of Hawaii, passed the Land Act. In this act, three types of homestead agreements were defined: (1) the Homestead lease; (2) the Right of Purchase Lease; and (3) the Cash Freehold Agreement. The Homestead Lease was for a term of 999 years, and was issued after the applicants complied with terms and conditions of a Certificate of Occupation. The Right of Purchase Lease was a lease for 21 years with the right of purchase at anytime after the end of the third year of full compliance with the stipulated conditions of residence, cultivation, fencing, payment of taxes, and payment of the purchase price. The Cash Freehold Agreement was an agreement of sale in which the purchaser paid 25% of the purchase price in down payments, and 25% on the remainder for the next three years. (cf. George Luter, 1961)

The Land Act of 1895 specifically noted that “The lessee shall from the end of the first year of said term to the end of the fifth year thereof continuously maintain his home on such premises.” (Land Act of 1895, Section 61, Subsection 2). In a decision rendered in 1904, on conditions of the Homestead Act, Attorney General, Lorrin Andrews observed:

The subdivision of Section 61 before quoted, that “the lessee shall from the end of the first year” is mandatory. If he does not do so he forfeits his lease, and there is no provision of the law that I have been able to find that allows a public officer to take upon himself the burden of changing the conditions of a lease...

The idea of the legislature in creating these leases was clearly to encourage settlement and residence upon lands of the government. It was not for the purpose of allowing persons to obtain farming lands at easy rates, but for the purpose of creating small farm homesteads where the parties would engage in farming and agricultural pursuits and increase in number the thrifty citizens of the Territory... [L. Andrews, November 25, 1904 – Hawaii State Archives; Series GOV2-8]

By the early 1900s, leases on sugar lands of the Laupāhoehoe vicinity were coming up for renewal, and residents (both Hawaiians and non-Hawaiians) of the area were applying to the newly formed Territorial Government, for homestead lands in the Laupāhoehoe vicinity. Generally, the people who applied for homestead lots in a given land were long-time residents of the *ahupua'a*—or of neighboring lands—they applied for. The Homestead Act allowed for lots of up to 20 acres to be granted homesteaders in Right of Purchase Leases (RPL), with the condition that the applicant would clear the land and plant sugar cane, which would in turn be sold to the Laupāhoehoe Sugar Company.

The lands set aside for the Laupāhoehoe Homesteads ranged from near sea level to around the 2,100 foot elevation. In the area below the 1,600 foot elevation, the sugar lands were divided into nearly 150 lots, for homesteading. On the lands extending from the 1,600 foot elevation, to about the

2,100 foot elevation, forty (40) homestead lots were set out (*Figure 4*). These lots extend south, from middle Laupāhoehoe, across all of the lands to Moanalulu (covering nine *ahupuaʻa*), and are situated within a zone previously forested, in a region not cultivated with sugar up to the time of the homestead program (see Register Map No. 2256, Newton, 1905).

Table 3 is a list of the forty lots which were made to develop the upper Laupāhoehoe Homesteads. The RPL lots were issued in two primary periods, 1904 and 1914. Both Hawaiians and other island residents applied for and were granted lots. Those lots which were not sold, or for which the applicants failed to meet the RPL requirements were planted by Laupāhoehoe Sugar plantation employees.

Land Use in the Forest and Upper Mountain Lands of the Upper Laupāhoehoe-Humuʻula Boundary (1840s-1960s)

As noted in earlier section of this study, by the 1840s, the western system of economics and land use were dominating the Hawaiian scene. As a result, the common people, who traditionally, had the right to access lands of their given *ahupuaʻa*—in pursuit of resources necessary to sustain their families and to provide resources to their chiefs—were becoming confined to specific parcels on which they were granted. The larger surrounding lands came to be controlled by large scale business interests, generally run by foreigners, or in partnership with chiefly lines and the government. In the Hilo forest region and mountain lands, two primary activities were becoming established— (1) hunting of bullocks and sheep; and (2) the milling of native woods to supply construction and fuel needs of the coastal communities. To a lesser extent, native practices, such as the collection of forest birds for feathers, the harvesting of *koa* logs for canoes, and limited upland agricultural pursuits were carried out. To date, we have found only limited documentation regarding these latter practices in the historical records—most of that in the form of testimonies by elder Hawaiians and foreign residents, recorded in between 1873 to the 1890s.

Among the descriptions of land use and activities in the forest lands of upper Laupāhoehoe and vicinity are the following communications, most of which are associated with the evolving ranching interests in the region.

Lahaina

March 26, 1842

Kamehameha III and Kekauloahi; to John Davis Kuakini:

...This is our communication to you. George Bush is going up to Hawaii for the purpose of taking cattle on the mountain, to the amount of three hundred. These three hundred cattle are to settle the difficulty with Bill, formerly spoken of. These are what we have given him for the settlement of that difficulty. *When those three hundred are taken, then the kapu shall again be put on the cattle, according to the former charge...* [HSA ID Misc. Box 141]

November 1848

***Journal of Tour to Inspect Government Schools and Promote their Prosperity.
(Travels the Forest Region Route between Waimea and Laupāhoehoe):***

September 28th. Rode to Laupāhoehoe over a new and excellent road, and through as fine a county as I ever saw. Probably not less than 100 square miles of fine land lies waste in Hamakua; land well adapted to the cultivation of cane; but in some places there is a scarcity of water. Timber is near & abundant.

Sept. 30. Traveled in canoe to Hilo Bay; 9 hours on the water; wind ahead & sea rough. A very unpleasant time... [Public Instruction Series 261 – Box 1, fldr. 1848]

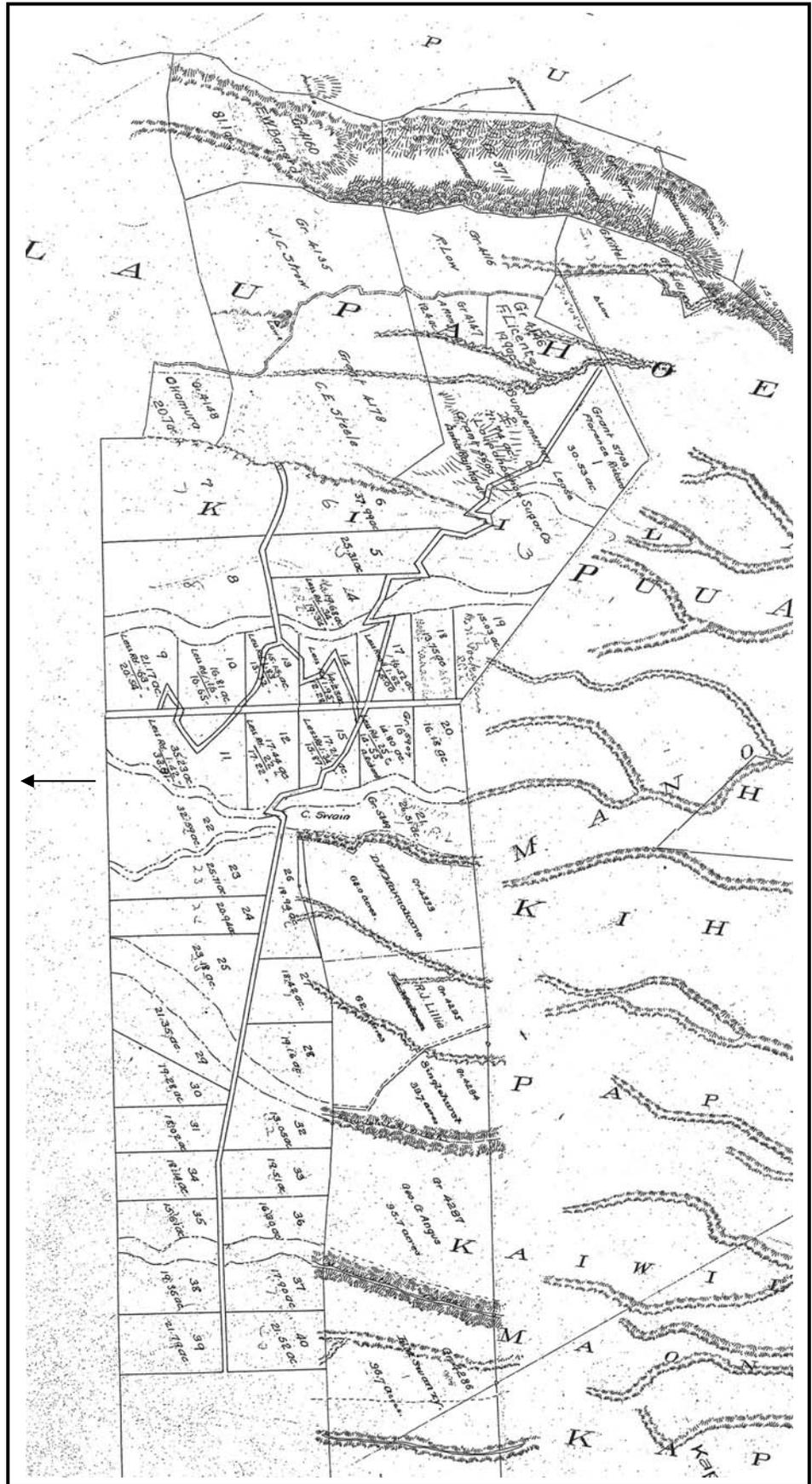


Figure 4.
Portion of Register Map
No. 1859 Depicting
Laupāhoehoe Homestead
Lots (1-40) Along Makai
Line of Government
Reserve Forest Lands
(Kanakanui, 1896)

Table 3. List of Laupāhoehoe Homestead Lots (1-40)

RPL No.	Lot	Grantee	Acres	Less Road Easement	Land Grant No.	Year
—	1	Florence Rickard	30.33	—	5706	1912
—	2	Anna Reinhardt	71.74	—	5600	1911
—	3	Flora Williams	37.36	—	7438	1920
554	4	Kahaawiola Lorenzo Mohika (Grantee)	19.68	0.34 ac.	7871	1921
—	5	Maria Ilalaole	25.31	—	7652	1920
—	6	Maria Ilalaole	37.99	—	7652	1920
—	7	(Laupahoehoe Sugar Co.)	59.97	—	8933	
—	8	Antone De Caires	48.45	—	8934	1925
—	9	Harry K. Kami	21.17	0.63 ac.	7905	1921
—	10	Harry K. Kami	16.81	0.16 ac.	7905	1921
—	11	Kaailau Botelho	35.23	1.42 ac.	8292	1923
553	12	D.K. Makaoi/ Charley Spencer	17.44	0.22 ac.	9001	1926
—	13	Lucy Wainee Akiona	15.15	1.83 ac.	10738	1939
555	14	Kailihune Alama	14.23	1.95 ac.	8300	1923
548	15	Malie Maluo	17.21	1.34	—	
549	16	Annie Rickard	14.80	0.25 ac.	5907	1913
553	17	Mary Akau Naomi Lonoaea (Grantee)	16.52	1.52 ac.	7727	1921
551	18	B. Kahaleohu	13.75	—	6079	1914
615	19	D.N. Poikalani	15.03	—	—	
550	20	Maria Simmons (Opu Kahaawiola)	16.18	—	6992	1918
556	21	C.S. Swain	26.51	—	5849	1913
—	22	(Laupahoehoe Sugar Co.)	35.59	—	9012	
—	23	Shojiro Yoshina	25.71	—	7603	1920
—	24	Shojiro Yoshina	20.94	—	7603	1920
—	25	Shojiro Yoshina	23.18	—	7603	1920
—	26	Gabriel Gamsky	18.84	—	7646	1920
—	27	Gabriel Gamsky	18.42	—	7646	1920
558	28	Wm. Kaahu (canceled) Gabriel Gamsky	19.16	—	7646	1920
—	29	Ana Poikalani	21.35	—	8266	1923
—	30	Ana Poikalani	19.28	—	8266	1923
—	31	Vida Ishibashi	18.02	—	8388	1924
—	32	John Okishoff	19.05	—	7395	1919
—	33	John Okishoff	19.51	—	7395	1919
—	34	Vida Ishibashi	18.14	—	8388	1924
—	35	Vida Ishibashi	15.61	—	8388	1924
—	36	J.W. Kekoa (heirs)	16.30	—	8473	1924
—	37	John Kapahu	17.90	—	8293	1923
—	38	Iona Kahana	19.85	—	9121	1926
—	39	Foma Franco	21.79	—	7336	1919
—	40	Foma Franco	21.52	—	7336	1919

January 16, 1857

**Francis Spencer; to John Young, Minister of Interior
(Regarding lease of Humu'ula and Kaohe for development of
sheep ranching interests):**

...The undersigned carrying on Sheep Farming &c. at Lihue, Waimea, Island of Hawaii, and being anxious to increase his Flock to an extent that would enable him to raise sufficient wool to make it a profitable business to export the same. And having ordered some pure blood Marino Sheep from Germany and New South Wales.

Beg Respectfully to offer to lease for a term of Twenty or more Years — Kalaieha part of the Government Land called Kaohe, district of Hamakua between Maunakea and Maunaloa. A small portion of which was let at five cents per Acre in mistake for his Majesty King Kamehameha IV. Land your petitioner is now informed the land belongs to the Government and Respectfully offers to lease say Ten Thousand Acres at Three Hundred Dollars per Annum allowing your petitioner at any time to annul the same. By forfeiting one years rent and all improvements. Your petitioner would further say there are no inhabitants within Thirty or Forty miles of the place and through the scarcity of water is not likely to be that, together with wild Dogs induces your petitioner to ask the privilege of annulling the lease with the above proviso. Trusting that your Excellency will be graciously pleased to grant my petition...

Resolved that the Minister of the Interior be authorized to lease 10,000 acres of land in Kaohe, Hamakua, Hawaii to F. Spencer at the rate of 6 cents per acre a year for such time as the Minister may see fit, provided however that the thousand acres applied for and now occupied by Mr. J. Low shall not be included in the 10,000 acres. [HSA-Interior Department Lands]

Hamakua, Hawaii

April 11, 1859

**J.P. Parker; to L. Kamehameha
(Regarding disposition of wild cattle in the forest and mountain
lands of the Government):**

...I beg leave to address Your Royal Highness on the subject of the unbranded cattle running in the *ohia* forest and among the fern on the Hamakua side of this Island on lands adjoining the leasehold lands held by myself and other private individuals all chiefly interested in the grazing business.

The cattle running in the district I speak of are, and have always been considered as totally distinct from the so called Mountain Cattle, inasmuch as they are all the breeding of private heads, and generally speaking a totally different breed. No cattle of any kind were ever seen or heard of in this Hamakua forest until the late Mr. French commenced purchasing and creating a herd and station on this very ground, in which business he was shortly followed by myself and afterwards by Harry Purdy, and on a smaller scale by a few other private individuals, and in the course of time this part of the island became the extensive and valuable private cattle land, the chief and by far the largest proportion of the herds being owned by the late Mr. French, myself and H. Purdy, whilst the Government owned no cattle whatever in this district. From the natives of the country to the Windward of our private lands (a dense forest and almost impenetrable undergrowth covering nearly the whole of it) as the herds increased, it became a impossibility to prevent cattle from time to time getting beyond the reach of our control, and gradually they have filled this land with their offspring, which, tho frequently driven partly out, and

collected as occasions and the opportunity served, on their play grounds in the forest, have not been generally branded, tho their private origin and ownership is notorious and cannot be disputed, but at the present moment, a difficulty of an unpleasant nature seems likely to occur, resulting directly from the contract lately made between the Government and Mr. Adams and since, transferred to another party, for the unbranded cattle running in certain districts specified as belonging to the Government.

A diversity of opinion exists as to the present ownership of the unbranded cattle in this bush and altho I, as perhaps the most interested party in the matter, have never for a moment opposed the Government, would consider it has any claim, yet I would desire now that a question has arisen on the subject, to have the matter settled beyond dispute and with that view, I would respectfully request that your Royal Highness will consider the question and apprise the parties interested of your decision. I may be allowed to report in conclusion that if these unbranded cattles shall be placed at the disposal of any party who may scour the forest with guns, spears and dogs, such a course will apparently result in the injury, and with a high destruction of the tame herds which are now one of the mainstays of this Island... [HSA – ID, Lands]

No Date (ca. 1860)

Manuia, et al., to L. Kamehameha

(Regarding the right to collect ‘ō‘ō, mamo, and other native birds from the Hilo Forest Lands):

...Be generous; We, your obedient people, residing on the land of Piihonua, Hilo, Island of Hawaii, humbly pray:

We have seen the notice of prohibition of the oo, the mamo, and other birds on said land, therefore, we pray unto you the King of the Hawaiian Islands, to release the restriction of the birds.

This is our desire of you, the King, that a division be made of the birds, some to you and some to us, if it is agreeable to you, Gracious King of the Hawaiian Islands, of our prayer, let us know immediately, do not delay.

THEREFORE, we are the ones whose names are below:

Manuia.

Mahoe.

Mahoahoa.

Hooikaika.

Haa.

[HSA, ID Lands, Doc. No. 89]

Piopio, Hilo, Hawaii

August 7, 1865

Isaac Y. Davies; to John O. Dominis

(Regarding Prohibition on Taking ‘Ō‘ō and Mamo birds):

...In accordance with your instructions, I have made and wrote out the notice of the King's lands being prohibited, that is concerning the Oo birds. But, I have also included the Mamo birds.

I am forwarding a copy of the notice aforesaid, and you send it and have it printed in the newspapers... [HSA, ID Lands]

Hamakua, Hawaii
September 5, 1865

S.C. Wiltse. to F.W. Hutchison:

...In compliance with your request of the 23rd inst., I have made out, and now forward to you, the names & description of the un-sold Government Lands in the Districts of "Hamakua," Kohala," & Kona." As far as I am acquainted with them. Likewise those sold but not Patented. There may be some small lands or fractions, that I have not mentioned.

Your Excel. will no doubt be some-what surprised to learn that there are so few land in these Districts remaining to Govt. but such is the fact, nearly all of the best lands have been sold, or rather given away, on a wage at about 50 cts. pr. Acre.

The forest lands as a general thing have been well preserved—and should be as a regulator of the climate.

A law was passed by the Legislature of 1862 requiring that the Boundaries to all the Private Lands not Patented, should be established by Survey or otherwise—worth in five years from that time. Three years have passed, and hardly a commencement has been made on this Island. It is highly important that this law should be enforced, as the old kamaainas are fast dying off, and in a very short time the establishing of Boundaries will be a near matter of Jury work.

When the Boundaries of the Private lands are established, then will be known what belongs to Government—and not until then.

I would very well like to know what disposition are to be made of the lands sold by Sheldon, whether the Parties who have paid him money and got no receipts, are to lease it, and whether any of said lands sold by him, are to be Patented at his valuation. [HSA, ID Lands]

Hamakua, February 10, 1866

S.C. Wiltse; to Jno. O. Dominis, Acting Commissioner for the Crown Lands:

I have added the survey of the *makai* part of *the Crown land* "Humuula" to the plan of the *mauka* part as you requested and will forward the same to you by the first opportunity. The field notes are also appended to the notes of the *mauka* part.

That part now added contains 7215 acres, 924 acres of which is good grazing land below the forest. *The forest part is a rich alluvial soil and covered with the largest growth of ohas and koa that is to be found on this Island.*

The reason for this survey was not reported to the late Mr. Webster at the time it was made because I had lost confidence in the men that pointed out the boundaries. They pretended to be Kamaainas of the old land and a survey was made accordingly. I afterwards ascertained that they knew little or nothing about the boundaries of the *mauka* part and so I had all of that work to do over again. But since then I have found out by inquiries and examinations that those men were Kamaainas of the lower part of this land, in fact the only men living that did know said boundaries through the forest. I am therefore able now to report that survey as correct according to the best of my knowledge... [HSA – Crown Lands Commission]

Hilo, Hawaii

April 21, 1866

R.A. Lyman. to J.O. Dominis

(Regarding the right to collect native birds, and the collection of Kōlea bark for tanning leather):

...Meheula desires me to write you in reference to Piihonua uka, Puueo uka, and Humuula, whether they are leased or not. *He has directed the bird catchers to divide the feathers with His Majesty, but Kui still claims the woods of Piihonua. Can I sell timber from the Crown lands? The natives wish to get Kōlea bark for tanning leather.*

It is a tree that is not worth anything for timber. *They have been selling the Koa trees getting bark.* Please send me a list of Crown lands in Hilo & Puna, and of their leases &c... ..Please give me full instructions what you wish me to do with these lands... [HSA, ID Lands]

On January 6th, 1871, the Commissioners of Crown Lands authorized an extension of ten years on the lease of Humu'ula to the "Waimea Grazing Company," also known as the Waimea Grazing and Agricultural Company; in which Francis Spencer was still a lead player at the time. The lease included the notes of survey, referencing key points along the boundary of the Hilo lands cut off by Humu'ula. It is of importance to note that the forest was to be protected, and all improvements such as walls, trails-roads, and structures were considered property of the Crown Lands Commission upon termination of the lease. *Figure 5*, Register Map No. 668 (Wiltse, 1862), depicts the boundaries and adjoining lands described in the lease of Humu'ula. The survey also takes the boundary of Humu'ula up to the summit of Mauna Kea, in the vicinity of "Pond Poliahu" (Lake Waiau), "Kaluakakoi" (The adze-quarries).

January 6, 1871

Indenture Between the Commissioners of Crown Lands, and the Association known as the Waimea Grazing Company:

All that tract or parcel of land situated on the Island of Hawaii known and described as follows to wit:

Humuula— "Commencing at a pile of rocks erected on Papaalepo Hill, the bottom rock marked KIV on the Boundary of Komoko [Kamoku]. The boundary runs...to a pile of rocks, bottom rock marked KIV, on the top of a small hill called Ahuamoa; thence...to the top of a low flat hill called Ahuapoopuaa at the *mauka* corner of the land of Komoko; thence in a South Westerly direction bounded by the lands of Kaohe and Kalala to a rock on the slope of Mauna Loa called Pohakuohanalei; thence in a North Easterly direction bounded by the land of Kapapala; thence in a North Westerly direction bounded by Waiakea; thence in a Northerly direction bounded by Mauna Kea, Piihonua, Makahanaloa, Hakalau, Piha, Maulua, *Kapehu* and *Laupahoehoe* to a pile of rocks on a rocky ridge running East & West; thence in a Northerly direction bounded by the other part of Humuula to Commencement..."

...During the term of Ten Years to commence the First day of January A.D. 1870... Paying therefore unto the said Land Commissioners or their successors in office, the yearly rent of Eight Hundred Dollars...and *that they will not commit or knowingly permit or suffer any waste to be done on the said demised premises, or cut down or permit to be cut down any trees on said land, of Humuula.*

And will at the end or expiration of the term hereby granted yield up unto the said Commissioners...the premises hereby demised, with all erections and buildings now on

or hereafter to be put upon the same in as good order and condition in all respects (reasonable wear and tear and damage by fire and other inevitable casualties excepted) as the same are at present or may hereafter be put by the said Party of the Second Part or those entitled to the Lessee's interest...

Jno. O. Dominis, Commissioner and Land Agent
The Waimea Grazing & Agricultural Co.
W.L. Green, President
Theo. H. Davies, Secretary

And it is further intended by the parties of the First Part to convey to the said parties of the Second Part the right to Kill all Wild and Unbranded Cattle within the District herein above referred to.

(Signed) Jno. O. Dominis. [HSA Lease Book, Series 369 Vol. 5; see also, BoC Liber 32:27-29]

Waimea
May 22nd, 1871
Chas. T. Gulick; to F. Spencer:

...I am directed by His Excellency the Minister of the Interior to acknowledge the receipt of yours of the 17th inst. in reference to the land of Kaohe, and he desires me to say that he has not had time to consult with Gov. Dominis, who has just returned from Hawaii, on the subject, but will investigate the matter and inform you further by next mail. His Excellency desires me to ask you if you will be kind enough to send him four (2 pairs) mountain geese (brandt) by the first opportunity – they are to exchange with the Acclimatization society of New Zealand which has already very kindly sent quite a number of their birds – The Minister is willing to pay a reasonable or even a handsome price for them, and is desirous of sending them, by the next trip of the Nevada which sails on the 4th or 5th of June...

P.S. If you can induce the natives to catch any of the Native Hawaiian birds – *not honey birds* – His Excellency is desirous of obtaining them for the same purpose, and will pay what you may consider a reasonable price for them. [HSA ID Letter Book 10:464]

In 1871, John Parker secured the lease on the Ka'ōhe mountain lands by conveyance, beating out the interests of Spencers' Waimea Grazing and Agricultural Company (WGAC). A further reduction of the WGAC's role on the mountain lands transpired on March 6, 1876, when the Commissioners of Crown Lands entered into a new lease for the land of Humu'ula, between itself and James W. Gay. The conveyance of March 6th, 1876, granted all the land of Humu'ula by terms of 25 years, including the right to kill wild and unbranded cattle from the land; though reserved the trees on the land. Also of importance, all improvements ranging from buildings, walls, trails and roads were to become the property of the Crown upon termination of the lease (Crown Lands Lease No. 75). The agreement, though for Humu'ula, is important to the history of the Laupāhoehoe forest lands, as the boundaries between the two areas had not at that time, been firmly set, and many of the activities of Gay's sheep station included use of resources from the Laupāhoehoe *koa* groves. Indeed while the lease agreement included clauses designed to protect the forest lands of Humu'ula, the Keanakolu Sheep Station and outlying buildings were almost entirely made of *koa* wood harvested from the rich regional forests.

**March 6, 1876 (Lease No. 75)
Crown Lands Estate, to James W. Gay
(Disposition and terms of the 25 year Lease of Humu'ula):**

...This Indenture made this Sixth day of March A.D. 1876 between the Commissioners of Crown Lands of the first part, and James W. Gay of Honolulu, in the Island of Oahu of the second part.

Witnesseth: That for and in consideration of the rents, covenants and agreements hereinafter reserved and contained on the part and behalf of the said party of the second part, his executors, administrators and assigns, to be paid, kept and performed, they the said parties of the first part, by virtue of the authority in them vested by the act entitled "An Act to relieve the Royal Domain from encumbrances and to render the same inalienable" approved January 3rd, 1865 lease demised and leased, and by these presents do demise and lease unto the said party of the second part, his executors, administrators and assigns, *all that tract and parcel of land situated in Island of Hawaii, one of the Hawaiian Islands known as the land of Humuula, the boundaries whereof are or will be more particularly described in the Certificate of the Commissioner of Boundaries for the said Island of Hawaii.*

Together with full and free liberty to kill all wild and unbranded cattle which may be found upon the said land. Except the timber trees, and all young trees fit and proper to be raised and preserved for timber trees, now growing or being, or which shall hereinafter grow, or be in and upon the above demised premises, or any part thereof together with free liberty of ingress, egress and regress, to and for the said parties of the first part and their successors in office. To Have and to Hold, all and singular, the said premises above mentioned described with the appurtenances (except as before) excepted unto the said party of the second part, his executors, administrators and assigns, for and during the term of twenty five years to commence from the first day of April A.D. 1876 the said party of the second part, his executors administrators and assigns, yielding and paying therefore, from and immediately after the commencement of the said term, and during the term thereof unto the said parties of the first part and their successors in office the yearly sum of Eight-hundred Dollars by semi-annual payments, dues and above all taxes, charges and advancements to be levied or composed thereon by Legislative authority the first payment of the said rent to be made on the first day of October next ensuing the date last aforesaid...

...And also that he the said party of the second part, his executors administrators and assigns *shall not nor will at any time during the term hereby granted, do or commit, or permit or suffer to be done, any willful or voluntary wastes, spoil or destruction, in and upon the above demised premises or any part thereof, or cut-down, or permit to be cut-down any trees now growing or being, or which shall hereinafter grow or be in and upon the above demised premises, or any part thereof, except for use on the said land: and will at the end or other sooner determination of the said term hereby granted, peaceably and quietly leave and up unto the Said parties of the first part, or their successors in office, all and singular the premises hereby demised, with all erections, buildings and improvements of whatever name or nature, now on or which may be hereafter put, set up, erected and placed upon the same, in as good order and condition in all respects (reasonable use wear and tear excepted) as the same are at present or may hereafter be put by the said party of the second part, his executors, administrators and assigns.* And also that he the said party of the second part, his executors or administrators, or any of them, shall, not nor will at any time during the continuance of the said term, let, set or assign over the said premises, or any part thereof, to any person or persons

whomsoever, for any term or time whatsoever, without the license and consent of the said parties of the first part, or their successors in office, in writing, under their hands first had and obtained for such purpose... [BoC Liber 45:258-261]

In 1882, James W. Gay mortgaged the livestock and resources he held on Humu'ula, to Paul Isenberg, of Hackfeld Company. The description of the conveyance describes the land use activities from sugar plantation on the lowlands, to some 10,000 sheep on the sheep station lands.

August 5, 1882

J.W. Gay to P. Isenberg

Indenture of Livestock and Resources of the Humuula Sheep Station:

...This Indenture made the 5th day of Aug. A.D. 1882 between Jas. W. Gay of Waimea on the Island of Hawaii, Sheep farmer of the first part and Paul Isenberg of Honolulu on the Island of Oahu, Merchant of the second part. Whereas the said James W. Gay is the owner of certain *flock of sheep numbering in the whole Ten thousand or thereabouts* and branded [diagram given] now depasturing upon the land called and known as Humuula in the District of Hilo on the said Island of Hawaii and is also entitled under a certain Agreement dated the 17th day of June, 1881, made between him the said James W. Gay on behalf of himself and his then partner Llewellyn Smith of the first part, and the Ookala Sugar Plantation Company of the second part to one tenth part or share or one sixteenth part or share respectively of the sugar grown, produced or manufactured by the said Company from and planted upon certain parts of the said land of Humuula. And whereas the said Paul Isenberg hath agreed to lend and advance to the said James W. Gay the sum of Fifteen thousand Dollars upon the security of the said sheep and share in the said Sugar Now this Indenture Witnesseth that in pursuance of the said Agreement and in consideration of the sum of Fifteen thousand Dollars lent by the said Paul Isenberg to the said James W. Gay, the receipt whereof is hereby acknowledged. He the said James W. Gay doth hereby grant, bargain, sell, assign, transfer and make over unto the said Paul Isenberg, his executors, administrators and assigns all those flocks of sheep numbering together Ten thousand or thereabouts and branded and now depasturing, running or being upon the said land of Humuula part or parts thereof. Together with *all the natural increase of the said flocks and also all the wool now upon the said sheep or which during the continuance of this security may be produced and shown from the said sheep and their said increase*. And also all that the past share or proportion of him the said James W. Gay of in and to the said Sugar to be grown, produced or manufactured from cane grown upon the said land pursuant to the said Agreement... [BoC Liber 76:322-324]

Operations of the Humu'ula Sheep Station

In 1887, James Gay removed himself from the business enterprise at Humu'ula, and August and Armin Haneberg assumed management responsibilities of the Humuula Sheep Station Company¹¹. It was sometime in this period between transfer of the Humu'ula Sheep Station interests from Gay to Haneberg, that the sheep shearing barn and associated facilities at Keanakolu (the actual site), near the upper boundary of Laupāhoehoe-Pāpa'aloa, was relocated to the present-day Kalai'eha site. In 1885, Dr. E. Arning, photographed the Keanakolu Sheep Station buildings—note, the front building, reported as being made of *koa* logs (*Figures 6a & 6b*).

On November 5, 1889, an annual meeting of the Humuula Sheep Station Company took place, and officers were elected, they were: August Haneberg, President; Armin Haneberg, Vice President; J.F. Hackfeld, Secretary and Treasurer (A.W. Carter, Humuula File; Parker Ranch Collection). With this

¹¹ The date is based upon August Haneberg's testimony before the Commissioner on Boundaries in August 1891 (Boundary Commission Volume D - Hawaii).

action, the Haneberg brothers took over operation of the station, with its primary headquarters having been established in past years at Kalai'eha.



Figure 6a. The Humu'ula Sheep Station Facility at Keanakolu – 5,250 foot Elevation (September 7, 1885; E. Arning Photo No. 1.165, in Collection of Hawaiian Historical Society) (Copy Photo N1013)



Figure 6b. "Log cabin of koa wood at Sheep station in Humuula (Keanakolu, 5,250 foot elevation) (September 8, 1885; E. Arning Photo No. 1.166, in Collection of Hawaiian Historical Society) (Copy Photo N1012)

From the surviving Journal of August Haneberg (1890-1892), we learn much about the history and development of the sheep station, and use of lands in Humu'ula, and in the adjoining the *ahupua'a*. Among the descriptions of land use and development of facilities found in the journal, are those describing—Humu'ula Sheep Station, Kalai'eha Headquarters and out-stations at Pu'u 'O'o, Hopuwai, Laumai'a, and Keanakolu (the Laupāhoehoe Section).

We find references to named paddocks, and activities such as — construction and maintenance of buildings and support facilities at Humu'ula, Pu'u 'O'o, Hopuwai, Laumai'a, and Keanakolu; work on stone walls and fences at various locations along the boundary of Humu'ula, and in interior paddocks; and maintenance and development of trails and roadways from Humu'ula to Keanakolu and down to 'O'okala.

In September 1890, efforts were underway to kill the introduced thistle; by January 1891, Haneberg documented that efforts were underway to control the “Australian weed” (gorse); and by October 1891 crews were also periodically pulling out *Joi* weed. The journal entries also reference — the planting of cypress and pine trees at Humu'ula and Pu'u 'O'o; and planting of potatoes at Keanakolu and Hopuwai.

***Selected Entries from Haneberg's Journal—
Describing Land Use, Development of Station Features, and Daily Operations***

Thursday, October 15th 1891.

Proceeded with Pakenia to Laupāhoehoe where at ½ past 11 arrived; met laukea there and arranged with him to make appeal from Decision of Boundary Commissioner at Hilo concerning boundary between Kaohe and Humuula on its northern end; each party (Crown and H.S.S. Co.) to bear one half of the expenses, to be paid by the Company and to be deducted from the next rent; stopped over with McKinley.

Weather raining heavy all day without almost any interruption. [page 125]

Friday, October 16th 1891.

Returned from Laupāhoehoe with Pakenia to Hopuwai, inspected horses, all there (49) and in good order. When arriving at 11 o'clock at *Keanakolu* met Harry Johnson with pack animals and Native inquiring to go to *Maulua*. Refused them to pass over Humuula land but allowed them to proceed after they having acknowledged not to have any right to pass over Humuula land.

Weather fine till 2 o'clock when rain and fog again. [page 125-126]

Sunday, April 17th 1892.

During night Kramer arrived from Hopuwai reporting that Muller in *Keanakolu* was arrested and taken to *Laupāhoehoe*; that Eben P. Low got his left hand hurt by a lasso and was taken down to the Hopuwai house; Ah Ano returned with mail from Waimea; Waltjen in from Laumaia; Kramer left; Bormann left with horse “Kaluamakani” for Keanakolu; proceeded to Keanakolu; met at Hopuwai Low and Japanese Physician; arrived at Keanakolu at ½ past 6. [page 181]

Tuesday, April 19th 1892.

Returned from *Laupāhoehoe* to Kalaieha; Wulbers put in at *Keanakolu* again; Bormann returned to Kalaieha; 4 Japanese on Telephone line at Hopuwai; saw thick smoke at Puu Oo, met Spohler who told me that he made fire there, sent him out to extinguish it, reported to have done; arranged with Ah Ano to get in Johnny Morgan flock, but as a foal just born had to leave him behind; Ah Ano herds wethers afternoon; Kumahei in garden yet.

Weather extremely dry, day and night, no fog, mist or drip; Trade wind. [page 182]

General Lease No. 608 – Land of Humu’ula

Following the overthrow of the Hawaiian Monarchy, all Crown and Government (Kingdom) lands fell under the control of the provisional and then territorial government (as a result of annexation in 1898). Leases on the Humu’ula and Laupāhoehoe lands were extended to the previous lessees, and a new survey of Humu’ula was recorded, in which reference to the upper Laupāhoehoe forests was found. *Figure 7*, the map attached to Lease No. 608, also depicts only Laupāhoehoe as running to the upland forest boundary, between Waipunalei and Maulua.

December 30, 1907

General Lease No. 608

**Commission of Public Lands;
to Humuula Sheep Station–**

T. Clive Davies, President; E.H. Wodehouse, Treasurer:

...All of that portion of **Humuula**, Hilo, Hawaii, and more particularly described as follows:

Beginning at Government Survey Trig. Station “**Kole** South” (marked by ___ on set stone *ahu*) on hill of that same name on the South side of **Mauna Kea** and on the boundary of **Humuula** and **Kaohe** the true azimuth and distance to “**Aahuwela**” Trig. Station being 234° 44’ 30” 22851.8 feet and to “**Puu Oo**” Trig. Station being 307° 04’ 13” 11113.9 feet, as shown on Government Survey Registered Maps Nos. 1718 and 1809, and running by true azimuths:

- 1 – 193° 10’ 17260 feet along Kaohe to Kaupakuhale Hill;
- 2 – 199° 42’ 20” 26368.0 feet along Kaohe to Holei;
- 3 – 214° 30’ 9000 feet along Kaohe to Waikulukulu a point in Kaula Gulch;
- 4 – Thence following along the center of Kaula Gulch to a [___ diagram] cut in the rock ledge near the middle of said gulch at the old Keanakolu-Waimea trail crossing, the said gulch at this point being on the Hilo-Hamakua Boundary, the direct azimuth and distance being 214° 34’ 16000.0 feet;
- 5 – 322° 57’ 45” 4374.0 feet across the land of Humuula to the Northwest corner of Waipunalei at a point on the middle of three *koa* trees marked H, X and W respectively, the true azimuth and distance to “**Lahohinu Puu**” Trig. Station being 102° 00’ 1241.0 feet and the coordinated referred to “Kalepa” trig Station being 9613.4 feet North and 10936.0 feet East;
- 6 – 343° 03’ 03” 4502.0 feet along the *mauka* line of Waipunalei to a mound of stones by a *koa* tree marked “Poloka” at West brink or edge of a pool of water called *Kulanahakoi* [Kulanihakoi on the boundary of Laupāhoehoe, Waipunalei and Humu’ula];
- 7 – 49° 55’ 4638.0 feet along the North line of *Laupahoehoe* to Northwest corner of same at the crossing of the Hopuwai-Keanakolu trail over the “**Keahua-a**” or “Douglass Pit” Gully;
- 8 – 352° 02’ 12” 4125.0 feet along the *mauka* line of *Laupahoehoe* to the Northwest corner of Maulua Nui at *koa* tree surrounded by a mound of stones a little East of the Hopuwai-Keanakolu trail and at the bend of the same into *Kaiaiki Gully*;

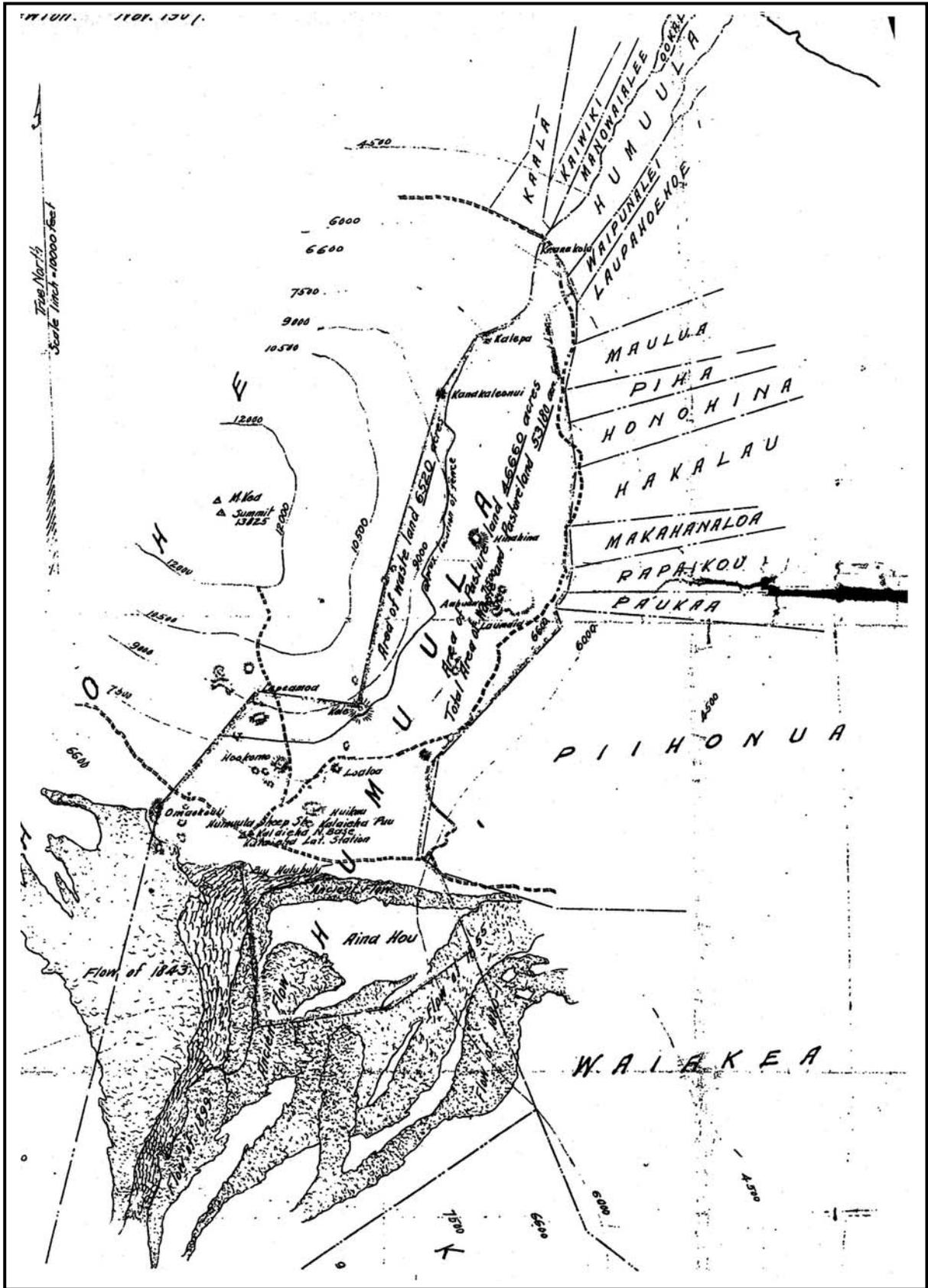


Figure 7. Map to General Lease No. 608, Portion of the land of Humu'ula (1907).
 (Note: Lands between Laupāhoehoe and Maulua not depicted on Boundary)

- 9 – 349° 23' 6208.0 feet along the *mauka* line of Maulua Nui to the Northwest corner of Piha at a point on the Hopuwai-Keanakolu Trail where it leaves the brush and enters on open flat covered with black sand, in the middle of which has been erected a large mound of stones called “Kahuwai”, the coordinates of said point referred to “Kalepa” Trip. Station being 7867.3 feet South and 10415.5 feet East...

Pasture Land 46660 Acres
Waste Land 6520 Acres
TOTAL AREA 53180 ACRES, more or less.

Special Conditions...

- (2) The lessor also reserves for public use all rights of way for present roads or trails across said land.
- (3) The Lessees to construct at their own cost and expense, within one year from the date of acquiring possession of the land under this lease, a lawful fence as defined by section 407, Revised Laws of Hawaii, along its entire boundaries, the location of said fence to be on the public land of Humuula at or reasonably near the boundary of said land, and to keep and maintain said fence in good repair during the term of the lease... [Lease No. 608 – State Land Division]

Ranches on the Mountain Lands Described in 1929

In 1929, L.A. Henke, published a “Survey of Livestock in Hawaii,” University of Hawaii Research Publication No. 5. The publication included historical descriptions of ranches throughout the Hawaiian Islands. The following narratives describe the primary ranches and their operations in the forest lands of the Hilo and Hāmākua Districts up to 1929.

The first of the forest land ranches to be discussed by Henke is Kūka‘iau Ranch. While Henke does not specifically reference the Maulua ranch station or Laupāhoehoe Forest fences, telephone lines or out-station, Kūka‘iau Ranch did operate in the forest zone, which makes up the proposed Laupāhoehoe HETF. This arrangement was in part facilitated by the fact that Theo. H. Davies, which represented Laupāhoehoe Sugar Company, also represented the Kūka‘iau Plantation and Ranch. The other two early ranches in the neighboring forest lands were Parker Ranch, and the Puu Oo or Shipman Ranch. Both of which regularly traversed the upper section of the Laupāhoehoe area as a part of their operations. Also of interest, Henke provides readers with documentation pertaining to the introduction of several species relied upon by the ranches as feed for their stock.

Kukaiau Ranch

Kukaiau Ranch is located above Kukaiau Plantation and the headquarters of the ranch are reached by an automobile road leading seven miles *mauka* from the government road.

Kukaiau Plantation was started about 1886 by John M. Homer and Kukaiau Ranch was started about 1887 by Chas. Notley above the sugar belt. The ranch lands begin mauka of the sugar plantation at the 2,300 foot elevation and extend up to 7,600 feet. The ranch headquarters are located at the 3,513 feet elevation.

The area at present consists of about 35,000 acres, about 2,000 of which are lava flows and 1,000 acres are so heavily wooded with blue gum trees that no grass is found between them. In May, 1928, the ranch carried 5,063 cattle, about 500 of which are

Holsteins and the balance well bred Herefords. The ranch also had 294 horses, 100 mules and 3 jacks at that time. Forty nine of the horses are heavy brood mares of the Percheron breed, which are largely bred to jacks to produce mules. No sheep and practically no swine are kept at the present time.

The aim is to carry about one animal to seven acres. On this basis the ranch is slightly overstocked at the present time. The forage consists of native and imported grasses. *Paspalum dilatatum* does very well and buffalo grass (*Stenotaphrum americanum*) cocks foot (*Dactylis glomerata*) and mesquite (*Holcus lanatus*) are among the other leading forage grasses found on the ranch. Hilo grass (*Paspalum conjugatum*) is also found to some extent on parts of the ranch. Cultivated crops have been grown to some extent in days gone by but none are being produced at present.

The ranch is divided into about 30 large pastures with a total of about 150 miles of wire fencing, and a few stone fences.

Beef cattle are marketed at about 3 to 3 ½ years of age, at which time they weigh about 1,200 pounds and dress out slightly in excess of 50%. Calves are branded with the number of the year when born. About 1,000 to 1,100 are marketed annually, about 50% being sent to Honolulu, being [page 33] driven to Kukaiau Station, thence by train to Hilo and steamer to Honolulu. About 30% of those marketed annually are slaughtered locally and 20% are slaughtered in Hilo.

The Holstein male calves are sold as steers and at a given weight are as large as the Herefords but do not dress out quite as well. A few cross-breeds occur and at a given age these in the first generation are larger than either the Herefords or Holsteins. Holstein females are sold as dairy cows, locally and in Honolulu. No dairy products are produced except for local consumption.

The ranch has 52 Hereford bulls, 8 of which are imported and practically all are purebred. They have five purebred Holstein sires, one of which, Matador Segis Walker, originally purchased from a mainland Holstein breeder was later sold back to the same breeder for \$5,000, a price many times greater than the purchase price.

Mules are raised and sold to local sugar plantations. Perhaps the biggest problem is to get enough drinking water for the cattle. The rainfall averaged about 79.5 inches annually during thirty years at *Umikoa*, the station at the ranch headquarters. However, the rainfall varies greatly from year to year, being as low as 19.3 inches in 1897 and as high as 180.59 inches in 1902. A severe drought was experienced in 1920 and about 1,000 head were lost due to drought at that time.

Roofs are built in the various paddocks for catching the only water that can be secured, and the smallest of these roofs has an area of 10,000 square feet, and supplies about 600 cattle. Tanks are used to store this water, the total tank capacity at present being 2,140,000 gallons. This includes a 640,000-gallon reinforced concrete cistern. Additional water storage facilities are contemplated. Something in excess of 3,000,000 gallons storage capacity is desired.

The climate is cool, 34° F. being the record low temperature on the ranch. About 18 men are required to take care of the livestock on the ranch with additional men needed from time to time for special work. The ranch consists of about 2,000 acres held in fee simple by the owners, 20,000 acres are leased from the government and the balance is leased from other private owners.

Kukaiau Ranch interests were sold by Mr. Notley to J.M. Horner soon after he started same and Robert Horner was the manager for many years till 1912. The herd books of those early days (about 1890 to 1910) show that many Hereford bulls were purchased from Gudgell and Simpson, noted Hereford breeders of Independence, Mo., and these bulls were rich in the blood of Don Carlos, Beau Brummel, Lamplighter and Anxiety 4th, all outstanding animals in Hereford breed history. Excellent light horses, both standard breeds and thoroughbreds rich in the blood of Hambletonian X were imported and raised in the nineties and thereabouts when horse racing was more popular in Hawaii than it is at the present time. A small Short-horn herd was also maintained in the early days of the ranch. Good butter was made in the nineties but difficulty in marketing same caused this work to be abandoned. Good cattle giving 20-25 quarts of milk were, sold at that time for about \$75 each.

Mr. D.S. Macalister has been manager of the ranch since 1912. T.H. Davies & Co., Ltd., are the Honolulu agents. [page 34]

Parker Ranch

...The present Parker Ranch is the combination by purchase or lease at various times of smaller ranches which existed in this region, the *Humuula* sheep station consisting of 50,000 acres being acquired as late as 1914. The ranch derives its name from John P. Parker of Newton, Massachusetts, who was the original owner of the ranch (then much smaller than now) about 1830. He had two sons, John and Eben and one daughter, Mary, who married a Mr. Fuller. John P. Parker, Jr., succeeded his father as manager. Samuel Parker, a son of Eben Parker, was manager for a time. Following this Paul Jarrett was manager from about 1887 to 1899, when Alfred W. Carter became manager and has continued to the present time, his son Hartwell now acting as assistant manager... [page 37]

...The lands of the Parker Ranch extend from the sea to the slopes of Mauna Kea about 7500 feet elevation. Soil, rainfall, wind and temperature conditions vary widely in the different sections of the ranch. Some areas are not capable of carrying more than one steer to fifty acres while other more favored sections of the ranch may carry one head on about three acres... [page 38]

The Humuula Sheep Station

The sheep ranch headquarters are high up on the slopes of Mauna Kea, 32 miles from Kamuela. These lands, having an area of about 50,000 acres, became a part of the Parker Ranch in 1914 and have an elevation ranging between 6600 and 9500 feet. Twelve thousand Merinos are kept, all the rams being purebred.

The wethers average about a seven pound fleece and the ewes five pounds, the total wool production being about 70,000. [page 39]

Dressed two year old wethers weigh about 48 pounds. Present day demand is largely for lamb, but marketing lambs interferes with the wool production program.

This is a region of heavy dews and much fog and the sheep get all their water from the vegetation... [page 40]

Puu Oo Ranch

Puu Oo Ranch, largely on the slopes of Mauna Kea on a line between Hilo and the top of the mountain, has an area of 23,000 acres, 40 of which are held in fee simple, 13,000 are leased from the government and the balance from private parties. The ranch is located at an elevation ranging between 5,000 and 6,500 feet, and can be reached by an auto trail through Waikii and by horse trail from Hilo. The soil is good except for about 3,000 acres of rocky land between Mauna Kea and Mauna Loa. It is mostly an open forest country with *Ohia lehua*, *koa* (*Acacia koa*) and *mamani* (*Sophora chrysophylla*) trees.

This region has an annual rainfall of 92.48 inches based on eighteen years' records and the temperature has been observed to drop as low as 19° F. Water is secured from springs which lead to tanks and this ordinarily is an ample supply for the cattle. It is estimated that an average bullock drinks about 15 gallons per day. Puu Oo Ranch has about 75 miles of fence. This ranch carries about 4,000 high grade Herefords, 100 of the Hereford cows being registered animals. Forty-five bulls, all registered, are in service. All of the herd bulls except three from the Parker Ranch are Puu Oo raised. A total of about 1200 head are marketed annually from Keaau and Puu Oo Ranches, cattle from Keaau, the lower ranch, often being brought to Puu Oo for a year or more before marketing them.

Kentucky Blue Grass (*Poa pratensis*) with white clover (*Trifolium repens*) mixed in predominates as a forage grass in this section, and mesquite (*Holcus lanatus*) is considered very good. A wide variety of forage grasses are found, including cocks foot (*Dactylis glomerata*), *Paspalum dilatatum*, carpet grass (*Paspalum compressum*), redbud or Herd's grass (*Agrostis alba*), perennial rye (*Lolium perenne*), sweet vernal grass (*An-[page 42] thoxanthum odoratum*), *Phalarus bulbosa*, Begg's grass (*Cynodon dactylon*), tall meadow oat grass (*Arrhenatherum elatins*), brome grass (*Bromus unioloides*), *Panicum pruriens*, native sedges, creeping bent grass (*Agrostis alba var. maritima*), bird's foot trefoil clover (*Lotus corniculatus*), sheep sorrel (*Rumex acetosella*) and Hop vine clover (*Trifolium agrarium*), etc.

The lease on Puu Oo Ranch was purchased in 1899 by W. H. Shipman from John Baker, who started the ranch about 1896. He had built some fences, and about 600 head of mixed cattle, including some Longhorns, were found on the ranch at that time. Hereford bulls have been used on this ranch since 1900 and the cattle are well bred.

The ranch is still owned by W. H. Shipman, Ltd., and managed by W.H. Shipman and his son, H.C. Shipman. [Henke, 1929:43]

Transitions in Leasehold Interests and Land Use on the 'Āina Mauna (1950s-1960s)

By the middle 1950s a number of changes in ranch operations and management were occurring. In 1956, the Ka'ohē IV (Pōhaku) began to be withdrawn from the leases of the Parker Ranch, for military purposes (Governor's Executive Order No. 1719; and Presidential Executive Order No. 1167). By 1963, the ranch announced that it would be shutting down its sheep operation at Humu'ula, with all grazing activities focusing on cattle. Rally Greenwell, then manager of Parker Ranch, and Richard Smart, heir of the Parker Ranch Estate, announced the closure of the sheep operation at Humu'ula in the ranch newsletter, *Paka Paniolo*, observing:

February 1963

Sheep Raising Business

Over half a century of sheep raising on Parker Ranch will end next year in a program to enlarge the Ranch's cattle operations. Manager Radcliffe Greenwell has announced.

The Humuula Sheep Station will see a "peeling off" of its sheep population by June, 1964.

Greenwell said there would be no changes in Humuula personnel. Foreman Peter L'Orange will continue as head of Humuula operations.

"There are four reasons why Parker Ranch is stepping out of the sheep business," Greenwell said.

By disposing of the sheep and utilizing the 33,185 acres at Humuula solely for cattle raising, Parker Ranch will receive a far greater return on its investment. Our machinery is old. If we continue this operation we must invest thousands of dollars in new machinery. It is becoming more difficult to get men to shear.

Wild dogs and wild pigs kill a great many of our sheep. Predatory dogs will attack anything—ewes or lambs. The wild pigs go after only new born lambs. Of the 4,500 head of sheep at Humuula today, we suffer at least a five per cent loss from wild animals.

Greenwell said "the Ranch has stopped the breeding program. First lambs of the season will drop the end of February, these lambs to be marketed as soon as they are fat."

Shearing has started with about 40 to 50 a month going under the scissors.

Mutton is being sold at the Kamuela Meat Market, some shipped by the Market to Honolulu. Between 50 to 60 sheep are being marketed, this number to be increased to 200 a week as feed improves and the animals gain weight.

"We should get the sheep off Humuula by June of 1964, thereby increasing our cattle operations. About 85 per cent of the Humuula crew's time is spent on cattle work as it is," Greenwell said.

He said calves born and raised on the main Ranch will be weaned and sent to Humuula where they will stay until old enough either to be bred or fattened for market.

He said no physical changes are anticipated at the sheep station. Present employees will continue to live at Humuula.

Humuula is closely woven into the history of Parker Ranch.

The area is leased until June 1974, from the Hawaiian Homes Commission with the exception of a little finger of land known as Waipunalei near Keanakolu, which runs to a point above Laupahoehoe.

It is the highest elevation of any Parker Ranch land, a nippy country in the winter. Three times this past month the temperature has slid to 32 degrees and lower.

The Humuula Story

German immigrants first ranged sheep at Humuula and on the Mauna Kea slopes. Humuula was acquired by Sam Parker Jr. It was bought March 3, 1914 by the late Alfred W. Carter as trustee and manager of Parker Ranch. Waipunalei was bought from Colonel Samuel Parker at the same time, “being valuable on account of the water in the gulch.”

Humuula then included some 400 head of horses, 500 head of cattle, and 23,000 head of sheep. As high as 30,000 sheep have been run on the station.

In his early years as Parker Ranch manager, Mr. Carter authorized “small importations of sheep, recommending full blooded Shropshire or Southdown ewes, these to be already in lamb, to mix the blood.”

When the shipments reached Honolulu they were “admired by everyone—a prize lot.”

Experimentation proved these two breeds did not do so well at Humuula as Merinos.

In 1904, Mr. Carter bought the Puuloa Sheep Ranch for Parker Ranch from the MacFarlane Estate. The inventory showed 6,175 head of sheep. The sheep industry, from this point on, became an important factor in Ranch affairs.

Ten thousand pounds of wool were sent to Boston in 1904; 30,000 in 1908. A wool press was ordered from Sydney in 1912, also a shipment of rams.

Continued ram importations gradually raised the wool clip per animal. The wool was of a high quality desired by the trade. Shipments were made to Boston, headquarters of the United States wool market. Last year’s entire clip was sold to the Blue Mountain Wool Co., Portland, Ore.

Humuula has long been one of our greatest and finest sections and will continue to be...

“There will be no changes at Humuula. I regret we are moving out of the sheep business but I feel it is a step toward strengthening our cattle production,” Richard Smart said. [*Paka Paniolo*, February 1963. No. 15.]

Trails and Travel Through the Forest and Mountain Lands

In ancient time, travel across the mountain lands, via the *ala hele* (trails and byways), afforded people access to various localities, and also facilitated the collection of various resources including, but not limited to stone for adze; burial sites; ‘*ua’u*, *nēnē*, ‘*ō’ō*, *mamo* and other birds; and various plant materials. In 1793-1794, A. Menzies visited Hawai’i with Captain Vancouver, during which time Menzies and crew members walked inland with native guides to botanize and take readings of the topography. While ascending Mauna Loa, Menzies observed that the Hawaiians kept “*Mora*” (*heiau* – ceremonial sites) along the trails at which they regularly stopped in prayer and with offerings (Menzies 1908:110). The following excerpts from Menzies describe this practice:

“So bigoted are these people to their religion that here and there, on the sides of the path, they have little Morais, or spots consecrated to their Deity, which none of them ever pass without leaving something—let it be ever so trifling—to obtain his good will, and they were highly delighted, indeed, when we followed their example in throwing a nail or a few beads, or a piece of *tapa*, before their Deity, which the women were not allowed to pass without uncovering their breasts and shoulders.” [Menzies 1908:110]

While the above narrative was recorded on a trip to Mauna Loa, such protocol was uniformly practiced throughout the islands, and is deeply rooted in the spiritual beliefs of the people. There remain to this day, examples of small shrines, upright stones (*Pōhaku o Kāne*) and other features along trails across the mountain plateau, leading across the *‘āina mauna*, and to the summit of Mauna Kea. It may also be assumed that such shrines occur in the Laupāhoehoe forest lands.

By the 1840s, social and economic pressures led to the formalization of a road division in the Hawaiian Kingdom. Native *ala hele*, which had been used for centuries and often provided the “path of least resistance,” to travel around and across the island, proved inadequate for the new methods of travel with horses, wagons and team animals. In 1847, Kamehameha III instructed island governors to undertake the survey of routes and construction of new roads, which became known as the *Alanui Aupuni* (Government Roads). Construction was to be paid for through taxation and “labor days” of the residents of the lands through which the roads would pass. Governor Kapeau, on the island of Hawai‘i, expressed his thoughts on this matter to Premier and Minister of the Interior, Keoni Ana, in a letter of August 13, 1847:

Aloha oe e ka mea Hanohano –

I have a few questions which I wish to ask you. Will the police officers be required to pay, when they do not attend the Tuesday (*Poalua*) labor days? How about parents who have several children? What about school teachers and school agents? Are they not required to work like all other people when there is Government work on the roads and highways?

I believe that school agents, school teachers and parents who have several children, should only go and work on the weeks of the public, and not on the *Konohiki* days....

...The roads from Kailua and down the *pali* of Kealakekua, and from Kailua to Honokohau, Kaloko, Ooma, and places spoken of to our King, and from thence to Kaeleluluhulu, are now being surveyed. When I find a suitable day, I will go to Napoopoo immediately, to confer with the old timers of that place, in order to decide upon the proper place to build the highway from Napoopoo to Honaunau, and Kauhako, and thence continue on to meet the road from Kau. The road is close to the shore of Kapalilua...

The width of the highways around Hawaii, is only one fathom, but, where it is suitable to widen where there is plenty of dirt, two fathoms and over would be all right... If the roads are put into proper condition, there are a lot of places for the strangers to visit when they come here. The Kilauea volcano, and the mountains of Maunaloa, Maunakea, and Hualalai.

There is only one trouble to prevent the building of a highway all around, the steep gulches at Waipio and Pololu, but this place can be left to the very last... [HSA – Interior Department, Roads; translation modified by Maly]

The great land resources of the Humu‘ula and Ka‘ohe region were early determined to be important to the development of ranching interests on Hawai‘i. Thus, while in most locations roads were improved through populated areas, on the mountain lands some old trails were modified or realigned to improve access to large tracts of Crown and Government Land. In addition to the formalized system of *Alanui Aupuni* (Government Roads), a number of smaller trails, running between the coast and mountains were maintained. In the forest lands, these trails included, but were not limited to the following: Koholālele, ‘Umikoa, Kūka‘iau; Ka‘ula-‘O‘okala; Humu‘ula; Waipunalei-Laupāhoehoe; Maulua; Hakalau; Kula‘imano-Makahalanaloa; and Pi‘ihonua-Kaūmana.

By 1854, the *Alanui Aupuni* included the Waimea-Mānā-Kula‘imano-Hilo route along the upper forest line of Hāmākua and Hilo. The route remained in use throughout the 1800s, with modifications in 1877, and again in the 1890s, as a part of the Humu‘ula Sheep Station operation. The earliest map

found, depicting trails across the mountain lands between Waimea, Humu'ula, and the coastal lands of Hilo was published in the *Pacific Commercial Advertiser* in 1859 (*Figure 8*). The map depicts two routes around Mauna Kea—the first, indicated as a solid line (a more significant route), extends from Kawaihae to Waimea, into Hāmākua, along the forest to Kula'imano, and then along the coast to Hilo Bay; a branch also continues along the forest to the Laumai'a vicinity. The second route, indicated by a dotted line, extends from Waimea, along the base of Mauna Kea to the Humu'ula-Kalai'eha vicinity. A third route is also depicted as a dotted line, out of Kailua, through the saddle between Hualālai and Mauna Loa, to the 1859 lava flow, and then across the saddle between Mauna Loa and Mauna Kea, down to Hilo.

Further modifications to the Kalai'eha Keanakolu-Mānā route (skirting upper Laupāhoehoe) were made as a part of the tenure of the Humu'ula Sheep Station-Parker Ranch operations, the Civilian Conservation Corps (CCC), and Territorial Forestry tenure of the land.

Historical Accounts of the Mountain Trails

In addition to the early narratives of travel through the Laupāhoehoe forest lands cited in this study, we find a collection of descriptions of trails, dating from May to December 1873, and August 1891. The accounts were recorded in formal proceedings, as testimonies were given by native informants regarding the boundaries of *ahupua'a* that extend into the Hilo forest region. These *ahupua'a* trails, known as *ala pi'i uka*, *ala pi'i mauna* (shore to mountain trails) were important to the native tenants as they provided them with access to the various elevational zone of their lands. Among the references to trails—most associated with bird catching, canoe making, and later bullock hunting—are the following:

Kahulanui — “The *mamani* grows on Humuula, the water is called Kapuuakala. I have been up the road on Makahanaloa with John Pilot and saw a place called Kapuuakala; this was before the land was surveyed” (Volume A No. 1:183).

Ili — “...came to *kahawai* of Kolekole and was told Hakalau was on Hamakua side of this gulch. Before we came to this gulch we came to Nahuina, where Hakalau road comes in” (Volume A No. 1:184).

Manuia — “Mawae is where Waiakea and Piihonua cut off Kaaumana, and the Mawae was covered up by the lava flow of 1855. I saw a pile of rocks there before the flow of 1852... This pile of stones was on the boundary between Piihonua and Waiakea. The boundary used to run up old road in a straight line from Kalapalapanui to Mawae...” (Volume B:23)

Nainoa — “The old trail from Humuula towards Piihonua used to run along the *mauka* edge of the woods, near the boundary, not in the woods” (Volume B:31). Waiki observed that “*The road in olden times, ran from Lahohinu to Laumaia, above the woods. No road from Humuula to Lai, along through the woods*” (Volume B:43).

Hanioa — “The road from Humuula to Piihonua runs along on the *pili*, and not in the woods. *The roads in the woods were only bird catchers roads*” (Volume B:45).

Kamohaiulu — “...along the land of Kahoahuna 1st to Lainakaunohi, a spot in the old canoe road of Humuula at Mauiana” (Volume B:48).

Naaikauna — “*In olden times the road from Humuula to Laumaia went along on the pili and not through the woods. I used to go into the woods a short distance catching birds, and then go back outside again*” (Volume B:52).

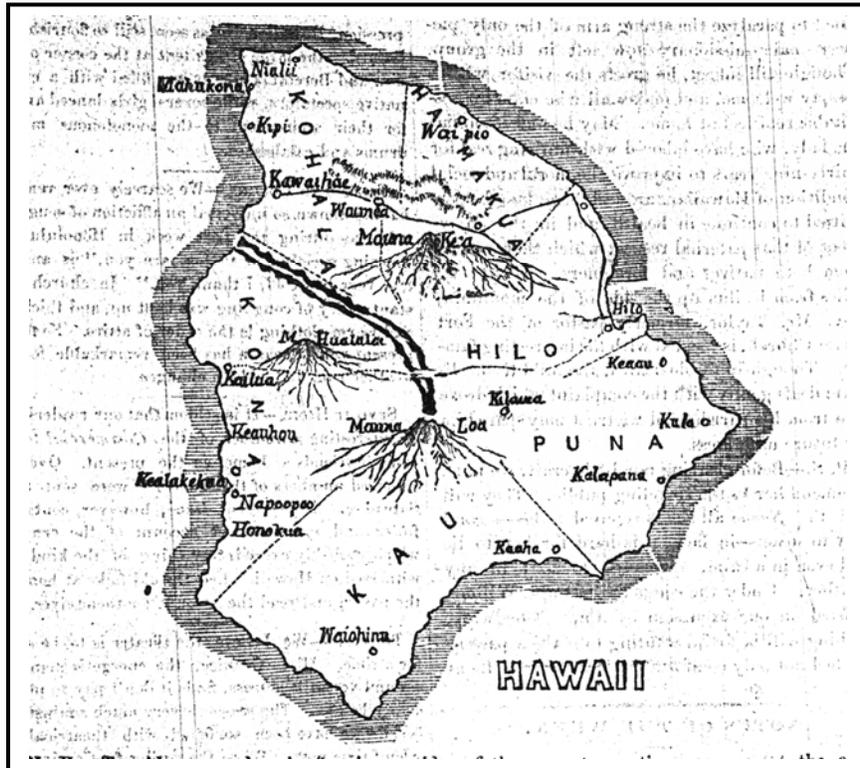


Figure 8. Roads and Trails of the Hawai'i Island Mountain Lands
(Pacific Commercial Advertiser, February 17, 1859)

Kainoa — “The ancient road runs along outside of the woods” (Volume B:56).

R. Lyman (notes from field visit with *kama'āina*) — “The boundary between Humu'ula and Makahanaloa as pointed out by Kahue is a hollow commencing on the ridge between these two lands, this ridge is the one on which the road from the beach, through Makahanaloa lies” (Volume B:176).

Amina — “The boundary from Iolehaehae to Poopuaa, a hill below, then to Puukalepa, at Kaula gulch. *I know Lahohinu on Humu'ula, near the road, a small road, the Government road is above that*” (Volume D:56).

Of particular interest to the Laupāhoehoe forest study area, is the trail which ran from the coastal region of Laupāhoehoe and Waipunalei to the old mountain trail, as described in traditional accounts, and in the recollections of elder *kama'āina*. We find in the period of the Humu'ula Sheep Station, that the upper lands of Laupāhoehoe, Maulua, Waipunalei and neighboring lands were also used as a part of the ranching operations. Boundary disputes were finally settled in the late 1890s (cf. Boundary Commission Documents). Also, the Shipman and Kūka'iau Ranches made use of lands in and neighboring Laupāhoehoe, and developed a series of trails for access between ranch stations. The ranches also developed telephone communication lines and maintenance trails for the same.

Figure 9 is a portion of Hawaii Territorial Survey Map No. 613 (1928), produced for the Mauna Kea Forest Reserve. On it are found trails at various elevations, running across Maulua, Laupāhoehoe, Waipunalei and Humu'ula, for access between various ranch facilities — “Shack Camp” (on Laupāhoehoe), Spring Camp, Nauhi Camp, and Keanakolu (the historic camp site of the CCC – not the original location of Keanakolu). Figure 10, a portion of Hawaii Territorial Survey Map No. 766 (1922), produced in conjunction with the Hilo Forest Reserve surveys, depicts some of the same trails, and also depicts the 'Umikoa Telephone line route crossing the Laupāhoehoe Forest Reserve lands, between the Maulua section of Kūka'iau and the Hāmākua land of the Kūka'iau Ranch.

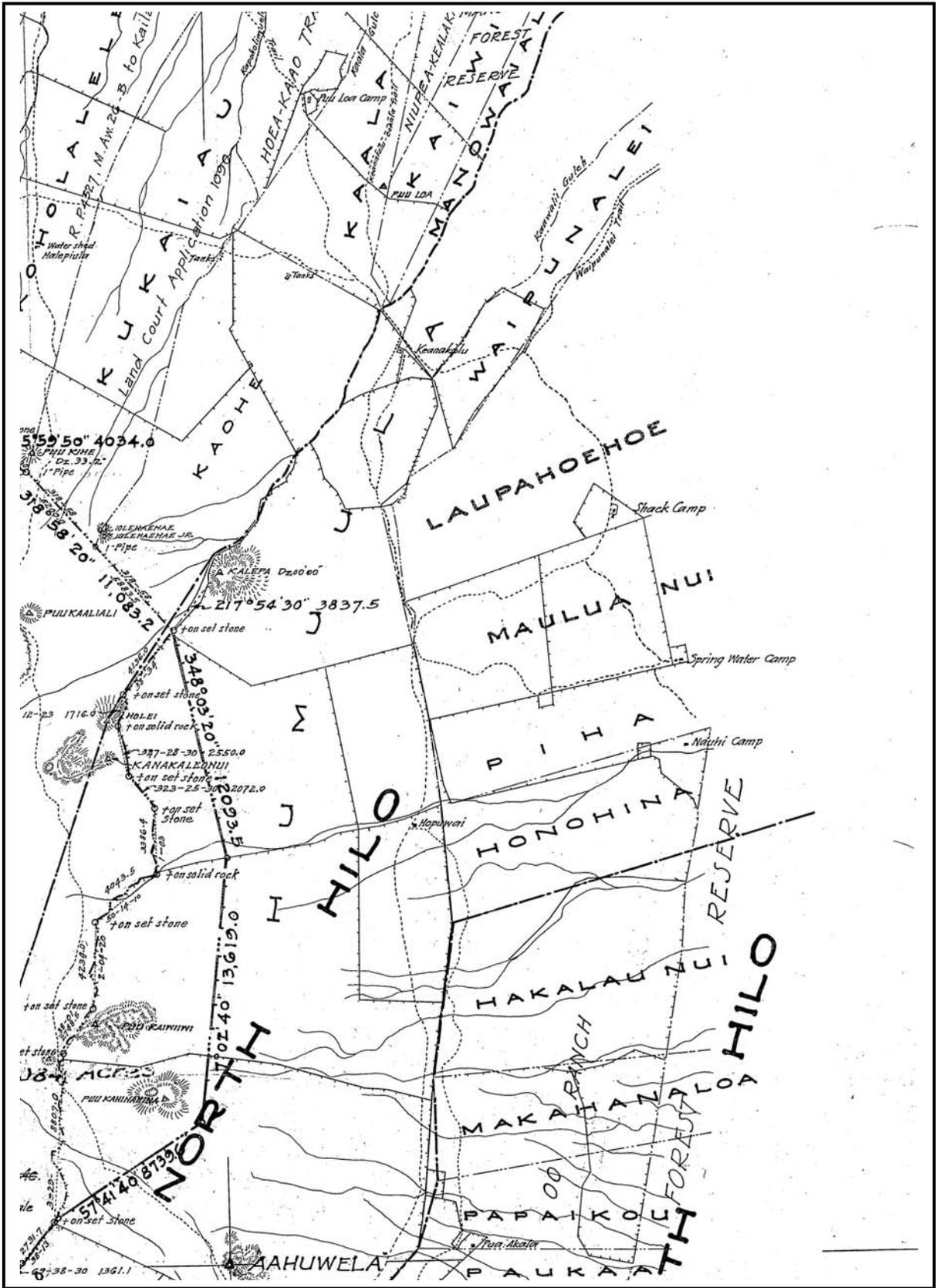


Figure 9. Portion of HTS Plat 613 – Mauna Kea Forest Reserve (Upper Laupāhoehoe Vicinity) (Evans & Murray, Surveyors, 1927-1928)

The 1982 map produced as a part of the designation of the Laupāhoehoe Natural Area Reserve, does not indicate the above referenced ranching trails or telephone line easements, but it does include the alignment of the “Logging Blair Road” in the northern section of the Laupāhoehoe Forest Reserve. The logging road, a part of the former Blair Woods Hawaii operation, extends from a section of government land in Laupāhoehoe—covered under State General Lease No. S-5320 (1993)—at about the 2,000 foot elevation to an area above the 6,000 foot elevation (*Figure 11*). The Blair operation accessed the forest for collection of *koa* and *‘ōhi‘a*, with which were made a variety of wooden objects for sale.

We note here, that as this “road” and other points of access cited on *Figures 9 & 10*, post-date the important “Highways Act of 1892” (Kingdom of Hawai‘i), they do not bear with them the protected, traditional rights of access, as do historic government roads and ancient trails of public travel, predating 1892. While this is the case, oral history interviews with elder *kama‘āina* and *paniolo* of the mountain lands, do describe travel via old trails and ranch accesses in the Laupāhoehoe section, and document that hunting occurred on the ranch and lease-hold government lands with permission of the land owners or lessees. So it is likely that evidence of twentieth century use of the lands might be found in addition to possible traditional features.

Descriptions of Trails and Roads on the Mountain Lands

In our research, we have found a number of letters in the government collections that describe the Kingdoms’ program of road development. The following letters come from the collection of the Hawaii State Archives (HSA), and described travel through the upper mountain road, skirting the Laupāhoehoe-Hilo forest lands.

Kaupakuea, Hilo, Hawaii

December 14, 1854

Contract to Construct Waimea-Kulaimano Road

(via the Hamakua Mountain lands)

***between T. Metcalf, Superintendent of Public Works,
and Jno. Van Houghten:***

...It is hereby agreed between John Van Houghten of the Island of Hawaii, and T. Metcalf, Superintendent of Public Work on the part of the Hawaiian Government. That said, John Van Houghten shall superintend the *construction of a road from Waimea to the present Aupuni Road in or near Kulaimano kai, Hilo. Said road to take the shortest and most eligible course through the mountain i.e. by the way of Hanaipoi, Puu Kalepa crossing the clinkers as high up as practicable, then through Nauhi to Palauolelo or thereabouts, selecting the most practicable starting point at the upper edge of woods. Then cutting to clearing out a road sixty feet wide down through woods to said Kulaimano kai. Said road to be prosecuted to completion with the utmost diligence and to be left in a condition practicable for carts or carriages to pass over its entire length.* Said Van Houghten is to make and perfect all contracts for labor, provisions &c. necessary, and pay for the same at the most reasonable rates in wild bullocks now running in the region of Maunakea, and he shall render a strict account of the same to the Superintendent of Public Works. The above work is to be executed to the entire satisfaction of the Superintendent of Public Works and for the faithful performance of which the said Superintendent of Public Works for as on the part of the Hawaiian Government hereby agrees to pay to said John Van Houghten or his representative five hundred wild bullocks above mentioned. The same to be caught and delivered at the expense of said Van Houghten.

In witness whereof we have hereunto set our hands this 14th day of December A.D. 1854, at Kaupakuea, Hilo, Hawaii... [HSA, Misc. Public Works, DAGS 7 Box 35; Fldr. 6]

December 22, 1856

**R.A.S. Wood, Superintendent Bureau of Public Works;
to R.C. Wyllie, Minister at War and Public Works
(Regarding payment for work on Mountain Road between Waimea
and Kulaimano, Hilo):**

I beg to state for your information and guidance in settling the claim of Mr. John Van Houghten for *the Mountain Road*, Hawaii, that 500 Wild Bullock was sold on the 3rd day Dec. to Mr. Bryan, for the sum of \$500. which price was considered fair. Mr. Metcalf accounted to me for that amount, after deducting \$360. 25/100 paid to Mr. Van Houghten, the balance was paid by Mr. M. in *ohea* [*ohia*] Lumber to this department – April 4th, 1856. [HSA – Public Works; DAGS 7, Box 35, Folder 6]

Honolulu, Oahu

December 22, 1856

John Van Houghten¹²; to Superintendent of Public Works:

...I beg leave to lay before you a statement of my claim for the information of His Excellency R.C. Wyllie for my services in forming the Mountain Road at Hawaii.

On the 14th day of December 1854 I entered into a contract with Mr. T. Metcalf, late Superintendent of Public Works, for the Superintendent for the construction of a road from Waimea to the present *Aupuni* road in or near Kulaimano Kai, Hilo and to make and perfect all contracts for labor, provisions necessary, and pay for the same at the most reasonable rates in wild bullock now running in the region of Maunakea, and he shall render a strict account of the same to the Superintendent of Public Works for the time being—and for the due performance of the said work to the satisfaction of the Superintendent of Public Works. I was to receive Five Hundred Wild Bullock to be caught and delivered at my own expense. I proceeded with the making of the said road for six months until stopped by you in a letter dated 2nd August, 1855. I now claim from the Hawaiian Government for money expended on the said road the sum of \$468.75 as per furnished and herewith enclosed from which sum I have deducted the sum of \$360.25 in cash and goods received from the hands of Mr. T. Metcalf and which leaves a balance in my favor from the Government the sum of \$108.50, besides 300 Bullock which is the number I claim in proportion for the work I have completed out of the 500 as per Agreement if the road had been entirely completed. I beg further to state that there is due to the natives for their labor the number of 188 Bullocks which they hold me responsible. I therefore urge upon you to lay this before His Excellency at your earliest convenience as I am now being delayed in Honolulu until this matter is arranged.

Comments by T. Metcalf:

I believe the amount claimed above by J. Van Houghten on his contract for superintending the Kawaihae to Hilo road to be fair & just... [HSA, Public Works DAGS 7, Box 35, Fldr. 6]

¹² John Van Houten (Houghten), was granted land at Laupāhoehoe (Royal Patent Grant No. 1963; discussed earlier in this study). It is likely that in undertaking his work on the mountain road described in this communication, that he and his crew traveled the Laupāhoehoe-Waipunalei Trail, probably making improvements on it as needed to transport supplies.

December 24, 1856

**R.A.S. Wood, Superintendent Bureau of Public Works;
to R.C. Wyllie, Minister at War and Public Works
(Regarding payment in bullocks, for work on Mountain Road between Waimea
and Kulaimano, Hilo):**

...Please pay to John Van Houghten on his order, Five Hundred & eighty eight wild bullock now running in the region of Maunakea, to be caught at his own expense, being the amount awarded on account of his contract for making new mountain road as follows, viz.:

	300	according to voucher No. 1. on Contract.
	100	according to voucher No. 2. on account.
	188	according to voucher No. 3. due to Natives.
Total	588.	

And charge the same to the appropriations of 1854, viz., \$2000 payable in Wild Bullock for making Mountain Road from Waimea to Hilo... [HSA – Public Works; DAGS 7, Box 35, Folder 6]

June 16, 1869

**S.C. Wiltse; to F.W. Hutchinson, Minister of the Interior
(Regarding Survey of new road from Waimea to Hilo, via Holokawai
– Hamakua Route):**

...Your letter dated June the 7th did not reach me in time to return an answer by the last mail, by some mistake my letter was forwarded to Mr. Holmes in Kohala & his letter sent to me.

You wish me to estimate the cost of surveying a route for a Road, from a point known as "Holokawai" on the *mauka* Hamakua Road to Hilo, by the Mountain road.

I beg to say that so little is known about the last 20 mls. of this rout, that it would be impossible for me, or any one, to estimate the cost for exploring and selecting the best rout for a Road for that part of the one proposed.

In common with everybody here, I am very anxious to see a Road opened from Waimea to Hilo by the mountain rout & will do the exploring & locating as cheap as it can possibly be done.

I am presently willing to leave it to your Excellency to say what it is worth after the work is done.

I would respectfully say, that there is already a good, natural road from Waimea to a point known as "Kalaeha" [Kalaieha] on the S.E. side of Mauna Kea. Distance about 35 mls. This rout is along the southern base of the mountain. Kalaeha is about 22 mls. from Hilo Bay on a direct line. When the road for this 22 mls. is built, the whole rout will be opened from Kawaihae to Hilo.

This rout is so much shorter & better everyway than the one by Holokawai around the northern base of the mountain, that there are hardly to be compared and Mr. Spencer should have told you so.

Should your Exel. decide to have me undertake this work I will be much obliged if you would advance me \$50. to pay expenses with, as I have not funds enough on hand of my own to do it... [HSA, ID Roads, Fldr. 5]

Waimea, Hawaii

June 13th, 1871

John A. Simmons; to F.W. Hutchinson

(Regarding funding for repair of Hamakua Mountain Road):

...The Mountain Road from Waimea requires about two hundred dollars, to place it on good order from that place to the Hamakua-Hilo Road, upon Kaohe, which amount I would respectfully ask be sent me. I have placed Guide Boards so that the stranger may no longer need a guide from Waimea to Hamakua. The two hundred dollars will make a Cart Road to where I mention... [HSA - ID Roads, Box 37, Fldr. 8]

Puuloa, Hawaii

October 7th, 1871

John A. Simmons; to F.W. Hutchinson

(Regarding completion of repairs on the Waimea-Hilo Mountain Road to Koholalele):

I have finished the Mountain Road from Waimea to Hamakua, a loaded wagon can now be driven from Kawaihae to the Landing at *Koholalele* in that District. The whole cost of which amounts to two hundred and twenty dollars.

I have had three new bridges made upon the Hilo Road from Waipio in the same district which cost One hundred and five dollars, in all expended \$325... [HSA - ID Roads, Box 37, Fldr. 8]

Honolulu

March 5, 1884

H. Hackfeld, Agent for the Humuula Sheep Station; to Chas. T. Gulick:

...The undersigned agents of the Humuula Sheep Station Company of Waimea, Hawaii, hereby most respectfully beg to petition your Excellency to grant a subsidy and encourage the Company to cut and build a road through the woods from Humuula to Ookala, the total cost of which is calculated to be about \$1200.

Said road would not alone open a very large area of land towards the Hamakua District, but also place all the neighboring Plantations in a position to obtain their Beef and Mutton from Humuula, whereas now they have to consent with great inconveniences in attempting to procure their supplies from distant places.

Trusting the foregoing will receive kind consideration, we remain... [HSA - ID Roads, Box 38, Fldr. 10]

Waimea March 30th, 1897

Wilmot Vredenburg; to J.A. King, Minister of the Interior

(Regarding disposition of the Waimea-Humuula Road and Waimea-Hamakua Road):

...Your favour to hand & contents noted. For the information wanted I enclose for you a rough sketch of the district showing the two roads in question.

The Humuula road is though in fact a Government road, yet in a strict practical sense, private one. It is used by no one except the Humuula Sheep Stn., and the Puuloa Sheep Ranch.

The road leading from Waimea to Hamakua is the only available road from the district of Hamakua to the landing of Kawaihae. In former years, people did not travel so much to Kawaihae to catch steamers, hence the neglect of this road, but of late the carriage and wagons passing over this road have cut it up to such an extent that in places, the ridge is almost touching the axles.

I drew Mr. J.F. Brown's attention to this matter and he promised to draw your attention to the road in question.

I do not deny that I will be particularly affected by the repairing of this road. It is for this reason that I have made an excessively low bid for its repair. Mr. Lidgate estimates the building of such roads at \$150. per mile, and this road is far nearer 5 miles than 4 ½ miles.

As I live midway on this road, I am in a better position to put the work through with dispatch. Besides this, I have several teams and plows that could be utilized to push this work through.

Our district is in a deplorable state as far as roads are concerned. The Kawaihae road is perfect as all our available funds are spent on this road only. The road from Waimea to Kohala does not exist any longer, though two appropriations have been made for it. It is now nearly a cattle trail.

The road to Humuula, as I have before stated, is not a public thoroughfare, and if you do not think fit to spend much on this road, I can have the stones thrown out and a little filling done, which will enable teams to get through a little better than they do at present. If you will look on the map of Hawaii you will see what extent of this road is in Hamakua, Hilo, and S. Kohala. I could not repair this road to the boundary for less than \$500. There is no water, and every drop has to be carted 10 miles.

Planters in Hamakua are getting a petition up in the matter of the road leading to Hamakua. You may probably receive it by this mail.

For the last 15 years south Kohala has not been extravagant in its demands for road funds. If I am not mistaken, this is the first instance of extraordinary repairs being asked for. I have done all in my power to further the cause of good roads but am not in a position to continually repair roads as I have done, after freshets, to enable my own teams to travel.

My offer to repair the Hamakua side of our roads for \$500. still stands good, and will keep it open until arrival of next Kinau's mails... [HSA – ID Roads, Hawaii, Box 42]

The “Blair Road” and Logging Operations in the Laupāhoehoe Forest (1970s)

As described in the preceding sections of the study, the value of the Laupāhoehoe region forests has been recognized for centuries. Ancient canoe makers, bird catchers, and others frequented the forest lands over the generations. By the middle 1800s, sawmills were established in areas of the larger Hilo forest lands from which lumber was harvested and milled for the evolving island community and businesses. The impacts of logging and grazing were noticed to be taking their toll on the land by the

middle to late 1800s, and Government Leases incorporated conditions meant to conserve the forest resources. After establishment of the Hilo Forest reserve in 1905, almost no collection of lumber, except for that in direct association with management of the ranch lands occurred in the Laupāhoehoe section. Cattle continued to degrade the upper forest lands, and through the 1900s, invasive species continued to work their way into sections of the forest.

In 1969, the State of Hawai'i entered into a "right of entry" agreement with Blair Limited, and subsequently into a logging agreement with the same outfit. Blair Limited was a part of Blair Woods Hawaii, which produced a wide range of items from native and introduced woods. Millard Blair established his wood shop in the late 1940s on O'ahu (pers comm. Walter Pomroy, Nov. 24, 2006). In the early 1960s Blair expanded his business and bought out the woodworks and mill operation of Myron Wold in Hilo. Blair retained Wold to manage the Hilo operation (then situated on Manono Street near the Wailoa State Park), and on July 10th, 1970, Blair was granted a permit to cut *koa* and 'ōhi'a lumber from the Laupāhoehoe Forest (Institute of Pacific Islands Forestry, 1989).

While the Blair permit was contested by a number of residents, the State determined that the invasive banana poka, impacts from cattle, and the death of trees, made salvage of lumber a viable action. Through the courtesy of Michael Constantinides and Lisa Hadway, files from the Department of Land and Natural Resources-Hilo Forest Reserve were reviewed. Through the notes below, readers are provided a general background of the "right of entry" (development of Blair Road) and the logging agreement.

The following notes, from the Department of Land and Natural Resources, dated March 12th, 1971, document a hearing and the decision pertaining to Conservation District Use Application No. HA-71/1/28-175, to harvest *koa* and 'ōhi'a from the Laupāhoehoe forest; and also document construction and purposes of the Blair Road (see *Figures 11, 12a & 12b* for general alignment of road).

The Division for several years has had plans to construct a road through Laupāhoehoe with C.I.P. funds for timber harvesting, administration and recreational use. This was consistent with the plan of the North Hilo community which recommended a road for local recreational use.

In 1969, Blair, Inc. applied to the Department of Land and Natural Resources for a right of entry permit to build a road for access with the expectation of obtaining a long-term timber license to harvest timber, primarily *koa* which this firm mills for craftwood, veneer flitches, and lumber. A right of entry permit to the elevation of approximately 4,500 feet was granted subject to construction of the road on a location designated by the Division of Forestry and with permission to harvest timber from the road right-of-way and for a distance of 150 feet on each side. Negotiations for a timber license were deferred. The Division needed to measure and map the timber, decide what portions of the area should be included in the sale area, and prepare a contract. This was the first offering of *koa* timber in a substantial quantity by the Division of Forestry...

After the timber was examined and mapped, a recommendation was made to retain 6,202 acres of the lower portion for an undisturbed natural area [the Laupāhoehoe Natural Area Reserve], a buffer zone of 1,425 acres between the road and the natural area, and the portion north of the road, 1,120 acres, for research (see map) [*Figures 12a & 12b*]. This left about 3,700 acres of the upper portion available for timber harvesting...

Without selective logging, banana poka and disease plus old age are causing a very rapid decline and death of the *koa* forest and its natural understory plant components. *Koa* trees are also dying of disease or old age in the absence of banana poka. There are few young *koa* trees and not enough reproduction to regenerate a vigorous *koa*

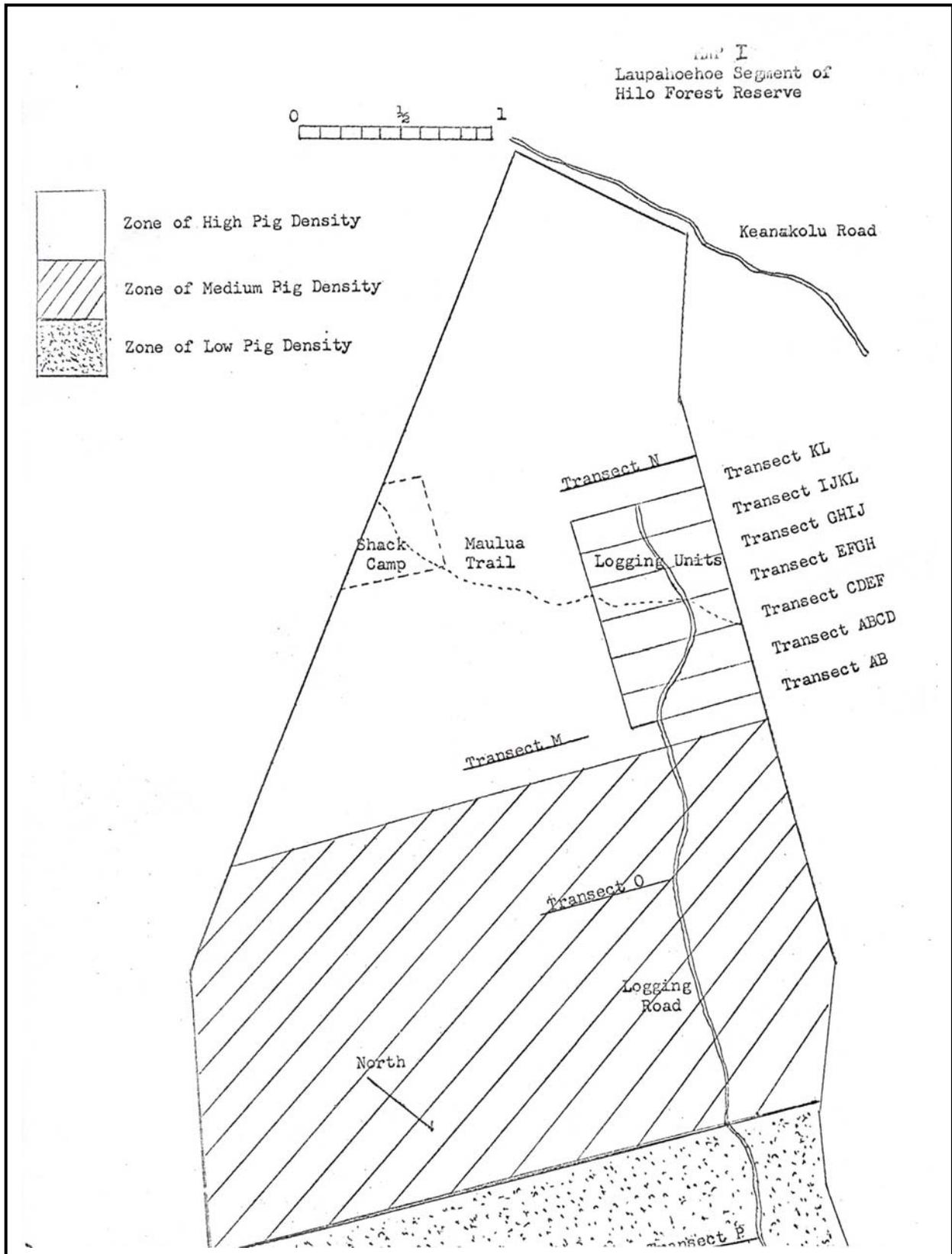


Figure 12a. Laupahoehoe Segment of the Hilo Forest Reserve – Feral Pig Survey in Conjunction with the Blair Logging Application (Jon Giffin, August 5, 1972)

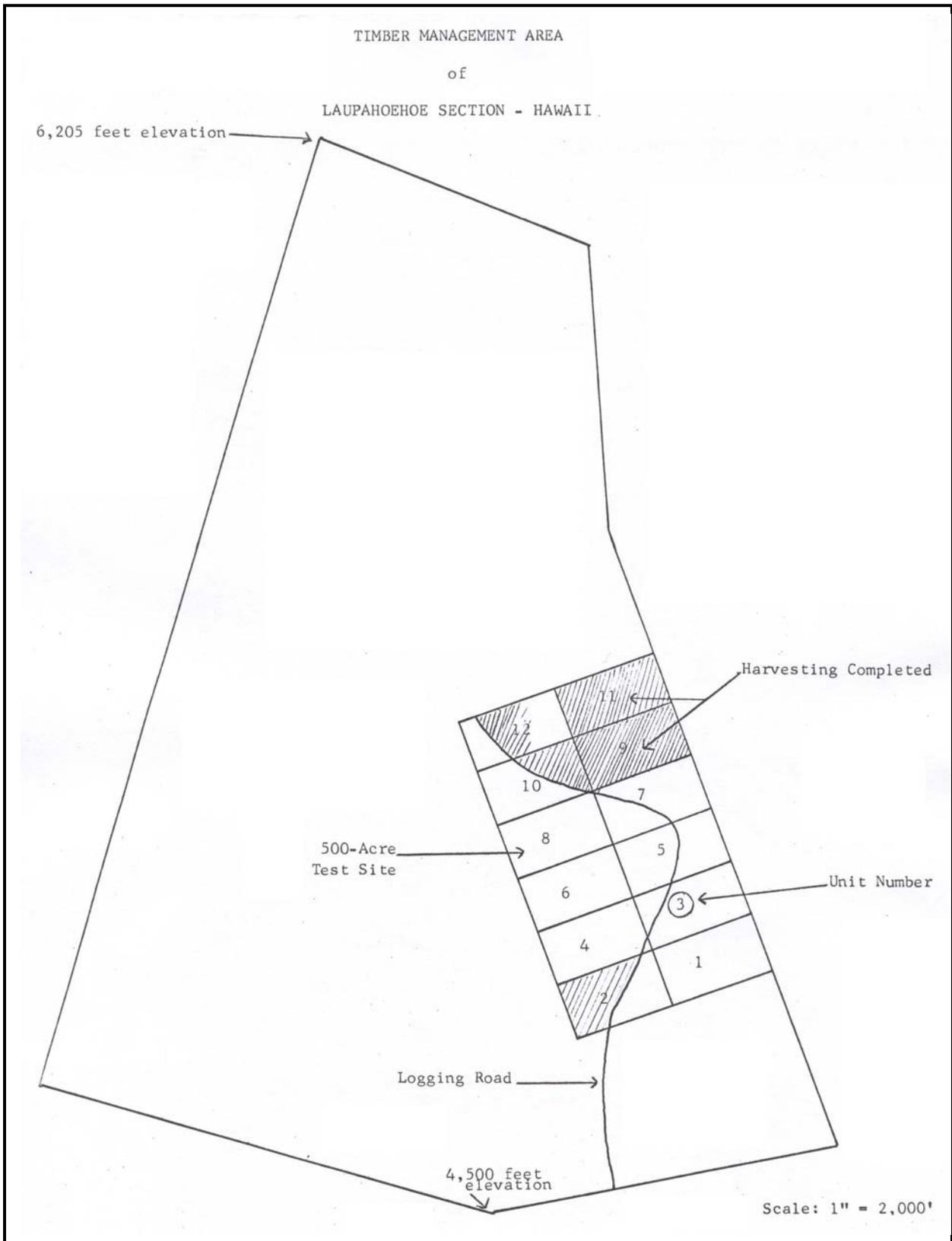


Figure 12b. 500-acre Cutting Unit at Laupahoehoe Timber Management Area (May 13, 1971)

forest. As the *koa* forest dies, dependent wildlife will decline. The prospects for saving this *koa* forest is dim without some intensive pest control and manipulative action to regenerate and then protect the *koa*. By manipulative action, I mean soil disturbance to obtain germination of *koa* seeds, which is common following disturbance or fire elsewhere.

We are practically certain that logging will result in vigorous regeneration of many *koa* from seeds in the soil and we will plant more *koa* where it reproduces sparsely, but the noxious banana poka vines will be a problem. We plan to make an “all out” effort to suppress them to give the young *koa* a head start... In the meantime, it seems certain that much of the *koa* and *ohia* will die and be wasted if it is not utilized rather soon...

We intend that the logging and regeneration be well regulated, orderly, and progressive. To give an idea of our methods, the proposed logging area will be divided into blocks as shown by the squares on the map. Most of these blocks contain about 90 acres. The logger will be required to complete his work on each block in the order indicated before moving to the next. The job will consist of felling all designated trees, removing from the area all usable products as defined in the contract, performing any specified soil erosion control and disposing of logging debris as directed. There are other requirements such as preventing needless injury to reserved trees, fire protection, and closing temporary roads. Forest regeneration and banana poka control by the Division will begin immediately after the completion of logging on each block. By this means, logging and silvicultural operations will not get into each other’s way. Furthermore, only a very limited portion of the sale area will be in a disturbed condition at any one time... [Report – Conservation District Use Application HA-71/1/28-175; February 26, 1971]

March 12, 1971

Conservation District Use Application HA-71/1/28-175, for Timber Harvesting Use at Laupahoehoe, Hawaii, by the Division of Forestry, Department of Land and Natural Resources.

Applicant:

Tom K. Tagawa
for Division of Forestry
Department of Land & Natural Resources
State of Hawaii
Honolulu, Hawaii

Use Requested:

Timber Harvesting

Location:

Hilo Forest Reserve
Laupahoehoe, Hawaii TMK 3-7-01:2

Area:

Approximately 3,700 acres.

Background:

The application for timber harvesting use within the Conservation District General Use Subzone was submitted on January 25, 1971 by the Division of Forestry. The Use Requested is permissible within this subzone.

The area of the Use Requested is located within the Hilo Forest Reserve. The proposed timber harvesting area starts approximately 6 miles above the Mamalahoa Highway at the 4,300 ft. elevation and ends at about the 6,000 foot elevation. *An access road to the proposed harvesting area was constructed by Blair Inc. The road is part of the Division of Forestry plan to facilitate access to the mauka area. Areas on the north, south and east borders of the proposed harvesting area are presently used for grazing purposes.*

The area below the harvesting site is managed as an important watershed for the Hawaii County Board of Water Supply. This area, about 6,000 acres, is being proposed as a natural area. [page 1]

The soil type include Latosolic Brown Forest and Lithosal and are quite variable. Soil varies in depth from quite shallow to several feet in depth. There are outcroppings of “aa” lava throughout and is generally underlaid by a solid lava formation as can be seen in the stream courses. Average rainfall varies between 60 and 80 inches per year.

Vegetation consists mainly of native *ohia* and *koa*, with an understory of tree ferns, *olapa*, *kolea*, *kopiko* and *alkala [akala]*. There is a heavy infestation of banana poka from the 6,000 ft. elevation to about the 5,000 ft. elevation. The infestation becomes progressively moderate to light in the lower elevations.

The Use Requested consists of harvesting *Koa* and *Ohia*. *Hapuu* Harvesting is not included in the proposed license.

The proposed harvesting plan divides the harvesting area into three compartments – A, B, and C. These compartments are further broken down into approximately 40 units which will be numbered numerically following the contour. The average unit size will be about 90 acres. Each unit will be surveyed and trees to be harvested within the unit will be designated by the Division of Forestry.

It is proposed that harvesting be limited to an annual maximum of one million board feet per year. If the logger fails to harvest the million board feet for any given year, he will be given only the following year to remove that uncut portion. After that period, the uncut portion reverts back to the State.

Approximate number of *ohia* and *koa* in the harvest area and the number of each type to be harvested is as follows:

	<u><i>Ohia</i></u>	<u><i>Koa</i></u>	<u>Total</u>
Harvest	22,411	14,901	37,312
Leave	153,417	12,994	166,411
Total	175,828	27,895	203,723

It is estimated that an average of 10 trees per acre will be harvested under this proposed plan. [page 2]

Provisions of the proposed timber license are as follows:

- a. Term of License is for eight years.
- b. Unmerchantable and small (less than 17 inches in diameter) will not be cut.
- c. Logging operations will not take place where stream courses may be affected.
- d. Logging operation will be postponed when ground conditions are such that excessive damage to the area will result.

- e. Compliance bond or surety shall be furnished by the Licensee prior to the logging operation.
- f. Roads will be maintained by the logger as necessary.

Summary of Government Agency and Division Comments:

The County of Hawaii Planning Department recommends that the use be permitted, but for only an area of about 300 acres, in the area most altered by exotics. They also recommend that the use be made subject to the following conditions:

1. Logging be limited to mature *ohia* and *koa* sawtimber selected by the State Forester to stimulate *koa* regeneration and to control the poka weed.
2. A sufficient quantity of mature trees should be left standing in each harvesting unit to provide adequate habitat for native species dependent upon the mature *ohia-koa* forest.
3. Adequate provision be made to control drainage, to prevent soil erosion and to minimize disturbance to the lower areas of the forest.
4. No harvesting of accessory or optional forest products to be permitted, in order to minimize damage to the forest understory and to protect young trees and seedlings.
5. Damage and deterioration to the domestic use homestead roads, culverts and bridges caused by trucks, equipment and hauling by the logger shall be repaired or maintained by the logger or the land owner. [page 3]

They also recommend that a comprehensive research program should be initiated studying and implementing the control of banana poka, the regeneration of *koa*, and the effects of logging on the varied biotic elements of the forest; an inventory of plants, birds, mammals and other organisms be made before and after logging. They state that application for timber harvesting of *koa* and *ohia* sawtimber in additional increments of this forest can be considered after it becomes apparent that harvested areas are responding favorably.

The United States Fish and Wildlife Service reports that it is highly possible that endangered Hawaiian forest birds exist in the area. These birds depend on a habitat of mature *ohia* and *koa* typical to that found in the subject area. They also state that the Hawaiian hawk and *akepa* are known to be in this area. They indicated that their biologist can make a survey of the area next month.

The Department of Health recommends that adequate and proper sanitary facilities be provided for employees during the term of the project.

The Division of Land Management has no objections to the Use.

DOWALD reports no objections to the Use provided that the harvesting is undertaken with good conservation measures to prevent soil erosion and other environmental degradation.

The Division of State Parks has no objection to selective cutting which leaves the soil, vegetation, wildlife, water courses, and the forest canopy as intact as possible. They state that this method is more consistent with natural beauty and is generally applicable to Hawaiian forests. With such forest management, the scenic and recreational potentials of the area can be maintained while an economic resource is utilized.

The Division of Fish and Game reports that judicious selective harvesting of *ohia* and *koa* should not significantly affect wildlife values. They state that they will inventory and monitor the pig and birdlife population in the area prior to and during the proposed harvesting, they coordinate their study with the Division of Forestry. [page 4]

Summary of Public Hearing:

A public hearing was held by the Board on February 26, 1971 in accordance with Act 264, 1969 SLH, to receive testimony on the subject application. Testimonies were received from: the County of Hawaii Planning Department (Donald Tong); the Hawaii Chapter of the Conservation Council, Flora and Fauna Committee (Mrs. Helen Baldwin); Mrs. McBride; KGMB (Linda Nakkim); Pat Dickson (student, U.H.); State Conservation Council of Hawaii; Kona Conservation Goup (Allen Slim Tyler); Former Deputy State Forester (Bill Bryan); Allen Slim Tyler; Hawaii Chapter of the Sierra Club (Wayne Gagne); Mr. Will Hyde; Mr. Norman Carlson; Mr. Alika Cooper; Hawaii Fish and Game Association (Alvin Tanaka, Masaichi Takaki); Mr. Strite Bianca (retired entomologist); Niu Nursery Ltd. (Mr. Sidney Goo, V.P.). A petition signed by 28 persons objecting to the Use was also submitted as part of the testimony.

Testimonies against the Use Requested were based on the following objections:

1. The area is a pristine forest and should be preserved for aesthetic, recreational and research purposes.
2. Prior to allowing the harvesting use, studies should be made to:
 - a. determine why the *koa* forest is deteriorating.
 - b. determine if the banana poka is the cause of this deterioration; and if it is, methods as to how the poka can be most effectively controlled;
 - c. determine the ecological effect of the harvesting on existing piglife and possible endangered native bird species which live in these forests;
 - d. determine if the forest will regenerate after the area is harvested;
3. The harvesting use is an unnecessary economic exploitation of the forest.
4. The harvesting use will adversely affect recreation potential of the area (hunting), and may result in severe reduction of wildlife. [page 5]

Testimonies in support of the Use Requested were based on the following:

1. The area is not a pristine forest. It has been invaded by banana poka and other elements and is deteriorating.
2. There are pristine forest areas below the proposed harvesting area which will be set aside as Natural Areas for hunting, research and preservation purposes.
3. Allowing the *koa* to deteriorate, without harvesting, would be a waste of a natural resource.
4. The Use Requested could provide an economic stimulus to the community.
5. There is little evidence that there are bird-life in the area which may be adversely affected by the Use Requested.

At the public hearing, State Forester, Tom Tagawa testified on behalf of the Division of Forestry. He pointed out that: the use is in accordance with the Division's timber management program which includes; reforestation program, preservation of natural

areas, and development of a forest industry in Hawaii; due to limitation of Hawaii's forest lands, it becomes essential that the principle of multiple use must be utilized, i.e. all uses. Then watershed, timber, forage, recreation, and wildlife habitat must be integrated and balanced as part of forestry management. The subject area has been designated for harvesting in the division's 6-year CIP program. Selection of the area was made on the basis of its harvestable timber, the deteriorating condition of the forest due to the infestation of banana poka and other noxious plants, old age, and subsequent regeneration of the forest. It is the division's opinion, that if selective harvesting is not done, the harvestable timber will deteriorate and eventually be lost, and the infestation of banana poka will spread to other healthy forest areas. The Division is of the opinion that selective harvesting will facilitate the regeneration of a new *koa* forest, and with proper follow-up, the infestation of banana poka can be controlled.

They believe that at worst there will be only a temporary setback on the bird and pig population of the area, until the forest regenerates. They propose to include in the harvest license a requirement that the licensee obtain a performance bond for the harvesting work. [page 6]

Analysis:

The Use Requested is in accordance with the Division of Forestry 6-year CIP Forest Management program.

The subject proposed harvest area, has been selected because in the Division's opinion, the forest is deteriorating and the infestation of banana poka will spread and infest other healthy forest stands, resulting in a loss of valuable timber resources.

The principle objections to the Use appears to be that there is inadequate information regarding the proposed harvesting use, with respect to effect on wildlife, control of pests and noxious plants such as the banana poka, and whether the harvesting will aid in regenerating a *koa* forest.

It is staff opinion that the forest is infested with banana poka, and possibly other noxious elements, and the forest will deteriorate without proper management. There is insufficient evidence at this time for staff to determine what effects a timber harvesting proposal will have on the wildlife population of the area, and whether the harvest will effectively control those elements which are presently causing the forest to deteriorate.

It is staff opinion that action of some sort is needed in the very near future if our forests are to remain healthy and accomplish the objective we have in mind. We therefore are of the opinion that an experimental area be tested along the lines recommended by the State Forester to measure the effectiveness of his proposals in meeting his objectives to promote forestry, recreation and wildlife. We further note that past practice in timber harvesting has not been the best and urge that tighter controls, inspection and better operational practices be set up to achieve the desired results.

Recommendation:

In view of the facts available, it is the staff recommendation that the application be approved for an area of approximately 500 acres only. (The selection of a 500 acres test area was made on the basis that it would provide an economic unit for the harvest license and provide a large enough area to determine the effectiveness of timber harvesting effect on wildlife and forest regeneration.) [page 7]

It is recommended that this area be located in the eastern sector of the proposed harvesting area, as shown on the attached map.

It is further recommended that this approval be made subject to the following conditions:

1. The Division of Forestry shall limit the timber harvesting license to a maximum term of two years, revocable after one year should there be indications that the objectives sought are not being met.
2. The harvesting license shall include the provision for the harvesting of only selected trees as designated by the Division of Forestry.
3. The harvesting license shall include the provision that a 50% performance bond be provided by the licensee.
4. Before the harvesting work is initiated, an inventory of the pig and bird populations of the area shall be made by the Division of Fish and Game. During the harvesting, the Division of Fish and Game shall periodically monitor this wildlife population to determine the effect of the harvesting on these elements. This work shall be done in close coordination with the Division of Forestry.
5. The Division of Forestry shall closely supervise the harvesting work. At any time should it appear that the licensee is not carrying out the provisions of the license or that the harvesting is causing destruction of wildlife in the forest, then all work shall be stopped immediately.
6. The Division of Forestry shall be responsible for seeing that any damage to culverts, bridges and other property by the harvesting shall be prepared to the satisfaction of the property owners.
7. The Division of Forestry shall monitor the effect of harvesting on forest regeneration and noxious infestation. [page 8]
8. The Division of Forestry shall maintain an aesthetic screen between the access road and the harvest area and minimize erosion along the roadsides.

Gordon Soh, Program Planning Coordinator

Recommended for Approval:

SUNAO KIDO, Chairman
[BLNR Files, March 12, 1971, page 9]

In between April to December 1971, Jon Giffin and Division of Forestry staff conducted a survey of feral pigs in the Laupāhoehoe forest lands, in conjunction with the Blair logging permit. The goal being to determine the impact of logging on the feral pig population. The report also provided a summary of the initial logging operation:

The Division of Forestry, Department of Land and Natural Resources, has let a contract for the harvesting of mature and over-mature *koa* trees within the Laupahoehoe section of the Hilo Forest Reserve. The harvesting of *Koa* will cause changes in the composition of the vegetation in the harvest area. These changes will effect the density and distribution of feral pigs in this very important public hunting area.

Right of entry was awarded to Blair, Limited on July 25, 1969 for the purpose of building a road through Laupahoehoe Forest Reserve. The actual road building began in October 1969 and proceeded from the lower boundary of the forest to the harvest area. When

the road was within walking distance of the harvest area, the Division of Forestry began surveying and marking logging units. Blair, Ltd. was awarded a land (timber) license on June 25, 1971 and began harvesting *koa* shortly thereafter...

The 500 acre harvest area was subdivided into 6 logging units of 83 1/3 acres each. The perimeter of each unit was then searched with trained dogs in an attempt to flush pigs. Data was recorded concerning the number of pig contacts per hour and pigs per 9,260 feet (perimeter of the logging unit)...

Initial *koa* harvesting began in Unit AB. As logging progressed, it became apparent that pig density was more consistent in the adjacent control areas than in the harvest area. Pig contacts varied from 2-20 per hour in the harvest area, but remained more consistent in the control areas varying from 5-13 per hours... During road building and timber harvesting, pigs appeared to concentrate in the harvest area to take advantage of uprooted *hapuu* (their staple food) and to root in the disturbed soil... [Report of J. Giffin, August 5, 1972]

Paul Scowcroft, who has been working on *koa* forest studies since the 1970s, reported that the Blair Limited operation took on a second 500 acre logging parcel in the middle 1970s. The second parcel was situated along the southern boundary of the first 500 acre parcel depicted in Figures 12a & 12b. The Blair logging operation was terminated by 1979, when Blair went out of business. Scowcroft observed that while requirements had been established for documenting the amount of timber harvested, apparently no records exist. So such information as to gross volume; what was taken from the forest; measurements and diameter of base and limb boughs; and quality and grades of milled lumber—information that would provide an important record of the forest resources—is not readily available (pers comm. Paul Scowcroft, December 5, 2006).

Blair Road itself, has been used by agency personnel to facilitate access to the Laupāhoehoe forest lands.

BOUNDARY COMMISSION PROCEEDINGS DESCRIPTIONS OF TRADITIONAL CUSTOMS, PRACTICES, RESOURCE COLLECTION AND LAND USE (1790s-1890s)

The most detailed accounts of traditional knowledge and cultural practices in the lands of the proposed Laupāhoehoe HETF and vicinity, are found in the formal proceedings of the Boundary Commission of the Kingdom. In 1862, a Commission of Boundaries (the Boundary Commission) was established to legally set the boundaries of *ahupua'a* that had been awarded to *Ali'i*, *Konohiki*, and foreigners during the *Māhele*.

By the middle 1860s, land owners and their lessees were petitioning to have the boundaries of their respective lands—which were the foundation of ranching interests on Hawai'i—settled. The mountain lands on the Island of Hawai'i, including those completely surrounding Mauna Kea, made up the heart land of the largest ranch in the Hawaiian Kingdom. As a result, Commissioner G.M. Robertson began taking testimonies from native residents by 1865, for lands of the Waimea-Waikōloa region. Following Robertson's death, brothers, Rufus and Fredrick Lyman continued the work and collection of detailed testimonies for the Third Judicial Circuit (Island of Hawai'i). Those testimonies of *kama'āina* (native) witnesses and resident foreigners, described the lands which rest upon Mauna Kea, and make up the forest region across the Districts of Hilo, Hāmākua and South Kohala.

In 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them (W.D. Alexander in Thrum 1891:117-118). The primary informants for the boundary descriptions were old native residents of the areas being discussed, generally born between the 1780s to 1830s. The native witnesses usually spoke in Hawaiian, and their testimony was translated into English and transcribed as the proceedings occurred.

The narratives cited in this collection have been excerpted from the testimonies given by native residents, or those given by surveyors who recorded the boundaries based on the testimony of native guides. The testimonies include descriptions of the land, extending from ocean fisheries to plateau lands, and mountain peaks. They also describe a wide range of traditional practices, travel, land use, resource collection, and changes in the landscape witnessed during their lifetime. Of interest to cultural practices and beliefs, the witnesses observed that—numerous *kauhale* (residence-shelters) were made in the forest lands by bird catchers and canoe makers; trails were known across the mountain, extending from the shore, through the forests, and around the mountain; cave shelters and water sources were known; *heiau* and places of worship existed; knowledge of the boundaries of *ahupua'a* were known in order to protect resources and gathering rights; and many sites were used for burials on the mountain slopes, particularly from the forest region to upper mountain slopes.

Readers will note that there are significant inconsistencies in spelling of various words, including place- and people-names, and features on the landscape. This is problematic, but with the help of maps produced as a part of the surveys to establish boundaries, and other period maps, many of the locations described can be identified. Unfortunately, not all of the maps associated with the Commission proceedings could be located in public collections. There are several maps which contain place names, and site and feature references made in the testimonies and decisions cited below. Among the maps are — Register Map No. 667 (D.H. Hitchcock, 1875), Register Map 668 (S. C. Wiltse, 1862); Register Map No. 1641 (C. Lyons, 1891); Register Map No. 1718 (Baldwin, 1891); Register Map No. 2139 (Loebenstein, 1894); Hawaii Territorial Survey Maps No. 613 and 799; Hawai'i State Survey Plat No. 723-A.

We have also observed that in some testimonies, when the original translator-transcriber used two of the same vowels, it indicated that he heard a lengthened pronunciation of a particular vowel. This emphasis of pronunciation is now indicated by a macron mark—for example, the word "*neenee*" (for

nēnē), the native goose hunted in the mountain lands of Humu‘ula and Ka‘ohe. While in the modern context of the language, two of the same vowels are generally both pronounced, and broken by an ‘*okina* or glottal mark. In the case above, we know that the word is not “*ne‘ene‘e*” for the Hawaiian goose.

In the following section of this study, testimonies and proceedings from selected lands which make up or adjoin the Laupāhoehoe forest lands are given verbatim. We have periodically used italics print to highlight references to place names, features, and practices, to draw readers attention to these important parts of the narratives. Among the practices, sites and locations described in the testimonies below are:

- *Ahupua‘a* boundaries pointed out so as to prevent trespass into other lands, while gathering resources. If caught taking resources from *ahupua‘a* other than your own, the items would be taken away.
- *Ahupua‘a* tenant rights to collect birds were enforced. Forest birds such as native honeycreepers (the ‘*ō‘ō*) were caught; *ua‘u* (*uwa‘u*) and *nēnē* were hunted.
- Bullock (Cattle) hunting was undertaken on mountain lands, for the *ali‘i*, *konohiki* and lessees of lands.
- Cattle documented as killing the forest; “the woods do not extend as far *mauka* as they did prior to the 1850s.”
- Dense forests described in reference to boundaries between Humu‘ula and smaller *ahupua‘a* towards the *makai* region.
- *Kauhale* (formal residences), and cave shelters identified in forest and mountain lands.
- *Koa* trees were harvested for canoe making; and trails for hauling canoes *makai* existed. *Koa* trees also used to mark boundaries by surveyors.
- *Mamani* (*māmane*) forests described in reference to boundaries of Humu‘ula and Ka‘ohe.
- *Pili* lands described in reference to boundaries of Humu‘ula and Ka‘ohe.
- Sandalwood and *pulu* collected on the mountain lands.
- Trails and roads described in testimonies, as extending from the shore to the mountain zone; used to travel between districts, and for practices such as collection of stone for adze making, bird catching, bullock hunting, and collection of other resources.

Documents and Excerpts of the Boundary Commission Testimonies

Hilo May 1st 1873

R.A. Lyman; to J.O. Dominis, Agt. of Crown Lands

(Regarding hearings for Crown Lands before Boundary Commission):

I have set the 2d of next June for the hearing of testimony for the settlement of the boundaries of Punahoa, Makahanaloa & Pepekeo in Hilo, Keaau & Keahialaka in Puna, Honuapo & Pakaniiki in Kau. I will have the hearing at Hilo. The Crown Com. are interested in the lands of Piihonua & Humuula joining Makahanaloa & Pepekeo, Ponohawai [Ponahawai] joining Punahoa 1st; Waiakea & Olaa joining Keaau in Puna.

Please to authorize some one to appear at the hearing and look after your interests...
[HSA – ID Lands]

Humuula Ahupuaa (1873)

The earliest detailed map of Humu‘ula was produced in 1862, and recorded as Register Map No. 668 (*Figure 5*). At the time of its survey by S.C. Wiltse, Humu‘ula reportedly included a portion of the summit of Mauna Kea—taking in Kaluakakoi (Keanakāko‘i) and Pond Poliahu (Lake Waiau). By the time the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them in 1874, disputes over the boundary of Humu‘ula and Ka‘ohe had arisen. Thus, at the

time of settlement in 1891, the boundary of Humu'ula was taken down to around the 9,000 foot elevation, with Ka'ohē taking in the entire summit region. Disputes were also settled between Humu'ula and the lands which it cut off along the forest region.

Humuula Ahupuaa
District of Hilo, Island of Hawaii
Boundary Commission, Hawaii, Volume A No. 1:238-240

Honolulu, July 7, 1873

R.A. Lyman, Esquire, Hilo

...Mr. F.H. Harris is authorized by the commissioners of Crown lands to make application to you as commissioner of Boundaries to have the boundaries of all Crown lands on the Island of Hawaii defined. He has a list of the lands with him...

I wish also to apply for the settlement of the boundaries of Honohina.

I remain, Yours respectfully
Jno. O. Dominis

Honorable R.A. Lyman, Boundary Commissioner for Island of Hawaii, Hawaiian Islands:
The undersigned would herewith make application for the settlement of the boundaries of the following named *Ahupuaa* or lands belonging to the Crown, viz.:

Waiakea in the District of Hilo bounded by Keaau, Olaa, Kapapala, Humuula, Piihonua.
Piihonua in the District of Hilo, bounded by Punahoa, Waiakea, Humuula and Puueo,
Paukaa & Alae and other lands names not known.
Ponahawai in the District of Hilo bounded by Punahoa, Kukuau & other small lands.
Hakalauike in the District of Hilo, adjoining lands unknown [Volume A, No. 1, page 238].
Humuula in the District of Hilo bounded by Kapapala, various lands in Kona and Kohala
and Hamakua, and Hakalau, Makahanaloa, Papaikou, Paukaa, Piihonua and
Waiakea in the District of Hilo...

Your Honor will therefore please appoint a day for hearing the evidence in the foregoing named lands and having decided upon the same to grant a certificate to that effect to the undersigned.

(Signed) Jno. O. Dominis, Crown Land Agent,
by F.H. Harris, attorney at law,
Hilo Hawaii, August 16th A.D. 1873

Humuula Ahupuaa
District of Hilo, Island of Hawaii
Boundary Commission, Hawaii, Volume B:28-59

The *Ahupuaa* of ***Humuula***, District of Hilo, Island of Hawaii, 3d Judicial Circuit

On this, the 3d day of November A.D. 1873 by adjournment from the 30th October, the Commission of Boundaries for the Island of Hawaii, 3d Judicial Circuit met at the Court House in Hilo, on the application of J.O. Dominis, Agent of Crown Lands for the settlement of the boundaries of Humuula, situated in the District of Hilo, Island of Hawaii.

Notice personally served on owners or Agents of adjoining lands, as far as known. Also served by publication in the Hawaiian Gazette of [left blank] and *Kuokoa* of [left blank].

Present, E.G. Hitchcock for applicant, for Mrs. L.K. Dominis, Her Excellency, R. Keelikolani, the Estate of Kamehameha V, C.R. Bishop and self, D. Kamai for Hawaiian Government Lands in Hilo, and D. Alapai.

For Petition see Folio 238, Book A.

Testimony

J.A. Simmons^K, Sworn:

I have lived on Hawaii for forty two years and in Hilo District about half of that time. *I shot wild cattle on Humuula for eight years.* This was soon after I came into the Country, but I have been there since. *I used to live with Ned Gurney at Lahohino [Lahohinu], a place above the woods on Humuula. He had lived there a great many years, and was kamaaina of the place. He and others pointed out to me the boundaries between Humuula and the lands of Maulua, Hakalau, Makahanaloa and Piihonua.*

Makaulaula^K and Opukeike^K, old bird catchers of Piihonua, also pointed out the boundaries to me, when I lived at Pahukea saw mills on Piihonua.

Humuula is bounded on the east side by Kahoahuna, the boundary is at the bottom of Kawalii gulch, where water sometimes runs; thence up the gulch, through the woods. Kahoahuna only extends a short distance and I do not know the names of the lands above Kahoahuna (Mrs. Halelea's). [Volume B, page 28]

The boundary as pointed out to me above the woods runs towards Hilo. The *mamani* &c being on Humuula until you come to Maulua. I do not know what lands bound it before you come to the land of Maulua. *The boundary between Humuula and Maulua (as pointed out to me) is at the edge of the woods makai of the mamani; the boundary of Maulua on the Hamakua side is at a gulch called Kaiaike [Kaiiaki, on Laupāhoehoe];* thence along the edge of the woods crossing two or three *awaawa* [gulch] to an *awaawa* at the junction of Maulua and Piha. I can go and point this place out, but I do not remember the name. Thence along the edge of the woods across the head of Piha to Naohe [Nauhi] gulch, at the junction of Hakalau, with Humuula and Piha (This is what I have always been told); thence along the head of Hakalau to Palauolelo gulch, the boundary runs to a pile of stones, on the Hilo side of the gulch, and about two hundred yards above the edge of the woods; thence along the head of Makahanaloa to Nukupahu gulch, the boundary running on the *makai* side of the *mamani*; thence (I was told) the boundary runs along the *mauka* edge of the woods along the land of Piihonua There may be other lands between Makahanaloa and Piihonua for I do not know how far Piihonua bounds Humuula, but I do know that the boundary of Humuula runs along the *mauka* edge of the woods. I do not know as Waiakea bounds it... [boundary description continues to the summit region of Mauna Loa]

...On Mauna Kea, Humuula (was pointed out to me) as extending up the mountain as far as the mamani grows. I do not know the names of the points on this boundary, but I could point them out if I went there. It comes over towards Hamakua to Iolehaehae; thence to Kaula gulch, where it enters the *mauka* edge of the forest. I do not know the boundaries through the [Volume B page 29] woods. The land of Kaala bounds Humuula just above the woods. The boundary at the Government road *makai* is at a small gulch on the Hamakua side of Kawalii gulch. I do not know the names of the gulch or lands that bounds it there.

CX'd. [Cross examined]

The boundary (as pointed out to me) after it runs through the woods, did not run *makai* into the woods again, but took the *mamani* above the woods. The lands *makai* run through the woods to *mamani*, there may be a tree or two of *mamani* in woods. *A great deal of the forest has been killed out by the cattle barking the trees and destroying the underbrush. Therefore the woods do not extend so far mauka as they did twenty years ago.*

Know the place called Puuoo, a big hill on the plains of Humuula is now called by that name, but the original Puuoo is a hill covered with *ohia*, and was told it was on the land of Waiakea. It is *makai* of the hill on Humuula, and I am certain it is not on that land. *I now live at Laupahoehoe.*

***Nainoa*^K Sworn:**

I am a *kamaaina* of Hamakua, at the time of Aipala, know a part of the boundaries of Humuula, as they were pointed out to me by people who are now dead. Li. Kauwila (his father) and Pali, who were *kamaainas* of Humuula showed me the boundaries, and told me not to go to certain places.

The boundary at shore is at Kawalii [Ka'awali'i] gulch and is bounded by Kahoahuna, thence *mauka* along the gulch to *Waipunalei*, do not know where Kahoahuna ends. Thence along *Waipunalei* to *Pihalei*, *Puu Mamake*, a point in the woods on *Kawalii* gulch; *thence along Maulua to a place called Kaiaike [Kai'aiki – on the Laupāhoehoe boundary], a kauhale [house site] on Humuula, at the mauka edge of the woods. The mamani is on Humuula and the woods are on Maulua.*

At *Pihalei* the boundary leaves the *Kawalii* gulch, and runs to the *Hilo* side of it along the land of *Maulua*, leaving [Volume B page 30] the gulch on *Humuula*. *From Kaiaike the boundary runs towards Hilo to Heenui a place where we used to catch birds, and the junction of Piha with Maulua and Humuula.* Thence along *Piha* to (*Naohe* [*Nauhi*]) *Pohohona*, and *awaawa*, at the edge of the woods, *makai* of the *kauhale* of *Naohe*. Thence along the *mauka* edge of the woods to *Kaloaloo*, the junction of *Hakalau* with *Humuula*. (The old people did not know what lands were between *Piha* and *Hakalau*). *Kaloaloo is a kauhale, and pond of water.* Thence along *Hakalau*; *makai* of the *mamani*, to *Palauolelo* a *kauhale* above the woods, on *Humuula*. Thence (I have heard) *Papaikou* joins *Humuula* and *Hakalau*; thence crossing the head of *Papaikou* to the *kahawai* *Kapuakala* which I have heard is a branch of the *Wailuku* gulch. The boundary runs to *Waipahoehoe* gulch, above the woods, the *mamani* being on *Humuula*. Thence to *Laumaia* along *Piihonua*; thence to *Aama*; thence to *Waikē* gulch. Thence to *Puuoo*, a hill above the woods, the boundary on the *makai* side. There are small trees on the hill and there is a *pond of water called Kaelewa* [*Kaelewai*] this side of it, above the woods, and towards *Mauna Loa* of *Puuoo*, it belongs to *Humuula*. *Humuula and Piihonua people used to go after water there.*

This is as far as I know the boundaries and as far as I went with the *kamaaina*... *The old trail from Humuula towards Piihonua used to run along the mauka edge of the woods, near the boundary, not in the woods.*

The *Humuula* and *Piihonua* people used to go after water at *Kaelewa*... The boundary above the woods is at *Kaula* gulch, said gulch runs *makai* but there are several lands between it [Volume B, page 31] and *Humuula*, *makai* of the woods.

Lahohinu is on *Humuula* near *Kaula* gulch. Thence *mauka* to *Ahupoopuaa* (an *ahua puu*), along *Kaala*; at this point *Kaohe* joins *Humuula* and cuts *Kaala* off. This is as far as I know the boundaries...

CX'd – ...I went after birds on Humuula for seven years and have often been there since. The line of the woods is in the same place now as in olden times. I have always heard that Maulua and other lands run through the woods to the makai side of the mamani. When I went after birds on Humuula Li told me not to catch the birds in koa and mamani, as they belong to the makai lands, and would be taken away by the people of those lands if I caught them.

J. Parker^K. Sworn:

I have lived on Hawaii nearly fifty years, used to live on the mountain, and shoot bullock for Kamehameha III at the time that natives were gathering sandal wood. I have been on Humuula after bullock and have heard the natives talking about the boundaries; they said that wherever the mamani grew, above the woods was Humuula, and the land below the mamani belonged to the makai lands. I have heard this from men who were old and gray headed then. In those days the mamani did not reach near to the koa, there used to be plains between, and I always understood that the tall forests belonged to the makai lands and the pili and mamani to Humuula. Hemahema's father (now dead) and Paakai, who was killed in a pit on the mountain were two of the ones that told me the above. I have always heard that Humuula commences at shore and runs up mauka, through the woods but I never heard that it runs back into the woods again. Have been up Maulua road and always understood that Maulua did not run through the woods, but I do not know whether Piha on Humuula cuts it off.

CX'd. [Volume B page 32]

Kahue^K. Sworn:

I was born at Humuula, am seventy three years of age, and a kamaaina of the land and know its boundaries. Kalaimaka, Mohaiku, Eekamoku (all dead) were kamaaina of Humuula and pointed out the boundaries to me. Kahoahuna bounds Humuula on the East side, the boundary beginning at the seashore in Kawalii gulch, thence mauka, along the center of the gulch to Mauiana gulch. At the mauka corner of Kahoahuna (said gulch is a branch of the Kawalii and enters it at this place.) Thence along the lands of Auliilii 2nd and Auliilii 1st across to Waiopae gulch (another branch of the Kawalii), the boundary running towards Hilo.

Kahoahuna runs into the woods, but where the oo [native honey creepers] are, is Humuula. From Waiopae the boundary runs in the woods to Waipahoehoe gulch, where Waipunalei joins Humuula. Waiopae is a large pool of water in the gulch. Waipahoehoe gulch runs clear through the woods and Waipunalei bounds Humuula to Piha-helei about three miles below the mauka edge of the woods. Thence towards Hilo, to the land of Laupahoehoe at Puukole, a kuahu manu [altar or ceremonial site for bird catchers] and kauhale [house or shelter], this place is away in the woods as far makai as Pihahelai, it is on Laupahoehoe. Thence to Puukoa, a hill covered with koa, on Kaiwilaihilaihi and Kapehu and at the junction of Kaiwilaihilaihi and Humuula. The boundary here runs mauka, and I think this point is a mile or more below the mauka edge of the woods. Thence along Kapehu to Puulehu a kauhale on Maulua, a mile or more from the edge of the woods. Thence along Maulua towards Hilo, to Kawelu, said place is near Heenui, and there is a mamani grove a short distance off. This place Kawelu is about a mile makai of the mauka edge of the forest. (Kaiiiki is mauka of Puulehu) Thence along the land of Piha. Kaluaalu mauka of the woods on Humuula, and Kumukawau, on Piha; directly makai, and about a mile below the edge of the forest. Thence along the land of Piha to Kaumuhapu [Kaumuhapuu], this place is directly makai of Naohe [Nauhi]. [Volume B, page 33] This place is a kualapa [ridge], and is where the people of Naohe used to go after hapu [hāpu'u]. Thence Hakalau joins Humuula at Naohe gulch at the mauka end of Umauma gulch. Kaumuhapu is above this gulch. Thence along Hakalau to Kupuna, a

water place directly *makai* of Hopuwai, outside of the woods. Kupuna is about a mile *makai* of the *mauka* edge of the woods. Thence to Makewai, a place where there is no water.

Na Waiahehu is a *kauhale*, outside of the woods near Hakalau gulch. From Makewai, the boundary runs through the woods to Kapahee, *he mau wai koloa* [where there are several duck ponds]. Kaloaloo is a *kualapa* above the woods. Kapahee is about a mile below the edge of the woods. Thence along Hakalau to a large water place called Kapohopaele, *makai* of Palauolelo, which is above the woods; thence along Makahanaloo to Waikaloo, a large pond of water on Papaikou. The point above this place is Kaaimana, a *kauhale* on Humuula. Waikaloo is about a mile *makai* of the *mauka* edge of the forest. Thence to Kumukawau, a *kauhale* on Papaikou. It is *makai* of Kapuakala; a *kauhale* on Humuula; and near the boundary of Paukaa. Thence to Kalapapainiu, a *kauhale* on Kualapa on Paukaa land and where Piihonua joins Humuula. There is no gulch here. Kapuakala is on the Hamakua side of this place, and the point of *koa* and *ohia* woods running out onto the plains; just *mauka* of these places is Lai [¹³]. (I went there a short time since with you and Hitchcock and we placed a marked rock at this point called Lai)... [Volume B, page 34]

The boundaries I have testified to are the ones my *Kupuna* told me. *The Waimea Grazing Co. rents* Humuula...

Papaaloo joins Humuula, also Kapehu and Kaiwilaihilaihi.

Adjourned to November 1873...

Hilo, November 4, 1873 Commission met according to adjournment...

Waiki^K Sworn:

I live at Humuula, was born there after the battle of Kekuakalani [1819], and know the boundaries of the land. *My parents told them to me. Eekamoku was my father and Koapunini my grandfather, they were bird catchers and canoe makers.* Kalaimaka, father of my wife pointed out the boundaries and told them to me.

He Ahupuaa [pig altar - *ahupua'a* boundary marker] is the boundary at seashore, bounded by Kahoahuna... ..Kahuahookolo bounds Humuula from Lainakaonohi to Waiopae, the corner of Na Kapaa. Thence along the land of Kapaa, following the gulch to *Olohe kahawai*, where the land of Waipunalei cuts Kapaa off and bounds Humuula. [Volume B, page 38] *Thence along Waipunalei running up the gulch to Waipahoehoe kauhale manu* [a bird catcher's house]. *Thence up the kahawai and awaawa to Pihahalei, a kauhale manu on Waipunalei. Here Waipunalei ends and the land of Laupahoehoe bounds Humuula. Thence along Laupahoehoe to Puukole a kauhale manu makai of Palipali.*

Puukole is on Laupahoehoe 2nd near the mauka edge of the woods. Thence along Laupahoehoe 1st to Puukole a place where there used to be a kauhale manu of Laupahoehoe 1st, about one half mile below the mauka edge of the woods. Pihahalei is about the same distance. Maulua land joins Laupahoehoe and Humuula at Puukole. (I should have said Papaaloo land joins here at this place.) Thence along Papaaloo to Puulehu, a kauhale at the junction of Maulua with Humuula. No other lands join Humuula between Papaaloo and Maulua, to my knowledge. Puulehu is about the same distance from the edge of the woods as Puukole. From Puulehu, the boundary between Humuula

¹³ The place name **Lai** is written as Lae on most of the Register Maps, and in surveyor's communications.

and Maulua runs to Uhakunou, *makai* of Heenui on Humuula about the same distance in the woods as Puulehu.

Thence along the land of Piha to Kawau, *kauhale manu* on Piha *makai* of Kalapaohelo. Thence along Piha to Kaluaalu, *makai* of Nahuaapaakai on Humuula. Kaluaalu is a cave in the *kahawai*. The boundary runs close to the cave and near to the edge of the woods, about as far from the edge of the woods as from here to the sea shore. Piha ends here and Nanue joins Humuula here... [Volume B, page 39]

CX'd.

The lands of Laupahoehoe reach further mauka than Waipunalei. Papaaloo used to extend on to the mountain, but in the time of Kamehameha I the boundary was established at the points I have mentioned. Papaaloo joins Maulua.

CX'd.

I went with Wiltse and Blodgett [1863]. We commenced to survey from the seashore... I went through the woods, Naaikauna then went. I went on the Hilo boundary of the land and Naaikauna went there also. Aipala and Kahunanui (now dead) also went with Blodgett. Wiltse did not go this time.

At Kalaieha, went with them, sighted to Poliahu, Pohakuhanalei, and surveyed across the land. Thence went to Hopuwai. There chained to between Kumukawau and Kalualu. Thence to Uhakanou, marked in both places K. IV., thence to Puulehu. Thence along the edge of the woods to Pihahalei, passing *mauka* of Puukole etc. At Pihalei, *mauka* corner of Waipunalei, we stopped surveying... [Volume B, page 42]

...The road in olden times, ran from Lahohinu to Laumaia, above the woods. No road from Humuula to Lai, along through the woods. My Kupuna told me the birds on mamani and pili belonged to Humuula, and the birds in the forest to makai lands. I went with Henry and F.S. Lyman when Henry surveyed the land of Hakalau. I told him Makahanaloo was surveyed too far mauka and that the pili belonged to Humuula. They chained along the road above the woods. I and a kamaaina of Hakalau, pointing out the boundaries to them... I have testified today as the boundaries were told me by my Kupuna, and as he pointed them out to me without being influenced by anyone...

Commission adjourned until November 6th at 10 o'clock a.m., 1873...

R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit [Volume B, page 43].

Hilo, November 6th 1873

Commission of Boundaries opened according to adjournment.

Present. E.G. Hitchcock, D. Kamai and S. Kipi for Estate of G.M. Robertson and D. Alapai.

Haniao^K Sworn: (Pretty old man and quite deaf)

I was born on Na Kapaa, at the time of the building of Mailikini [Mailekini *Heiau*, ca. 1791], the *heiau* at Kawaihae. Have always lived in the district of Hilo. Used to go on to Humuula after birds and know a part of the boundaries. My parents told me the boundaries. Kauhiahwiwa, Pau & Kameai (all dead) were bird catchers and knew the Hamakua, Kona and Kau boundaries... I cannot give the boundaries in the woods, after two Kahoahuna. *Papaaloo runs through the woods and joins Humuula. The mamani and pili are on Humuula, the woods on makai lands.* One of the Pihās runs through the woods and Laupahoehoe lands at Puukole. Heard that Maulua did not run clear through the

woods. In olden times Hakalau ran clear through the woods, to the *pili*... [Volume B, page 44] I always heard that the *pili* with trees growing on it was Humuula and the forest was *makai* lands. I used to go there to catch birds. *The road from Humuula to Piihonua runs along on the pili, and not in the woods. The roads in the woods were only bird catchers roads.* Papaaloo joined Humuula at Kaiiiki. Kihalani ends in the woods and does not reach through the woods. Kaiiiki is an old *kauhale manu* at the edge of the *pili* and forest and *awaawa*. Papaaloo bounds Humuula to Heenui, *kauhale manu*. *If folks from the makai lands came after birds in the mamani, the Humuula people would take them from them, and if we went into the bush after birds the people of the makai lands would take them away from us.*

From Heenui to Kalapaohelo, Maulua bounds Humuula. Kalapaohelo is a *kualapa* in *pili*, by the edge of the forest. Hakalau bounds Humuula from Waikalooa at Kanepuu, to Palauolelo... [Volume B page 45]

Kamohaiulu*^K *Sworn.

I was born at Laupahoehoe at the time of the building of the *heiau* at Kawaihae [ca. 1791], and have always lived there. Know the boundaries of Humuula on the Hilo side at shore, but do not know them on the Hamakua side. The boundary at shore is at Kawalii gulch at Kaahupuaa, bounded on Kahoahuna; thence *mauka* along the gulch to Piinau, *kauhale*; thence to Lapalapa, a cultivating ground. Thence the boundary runs up the *kahawai* to Mauiana gulch, a branch of the Kawalii. There Kahoahuna is cut off by Humuula. *Thence along the land of Kahoahuna 1st to Lainakaunohi, a spot in the old canoe road of Humuula at Mauiana.* The boundary leaves the gulch at Lainakaunohi, the boundary runs towards Hilo. At this place Auliilii 2nd and Auliilii 1st join Humuula. Thence to Waiopae a *kahawai*, at the high waterfall, Auliilii ends, and *Kahuahokolo bounds Humuula to Olohe Kahawai, a gulch, a place where we used to live and catch birds, and make canoes, [a] canoe road.* Pana 2nd and Pana 1st bound it from this point, but the land is very narrow. Then *Awaawaiki bounds Humuula to Waipahoehoe a gulch branch of Kawalii, and there Waipunalei bounds Humuula. Thence the boundary runs up an old trail Pihahalei, a puu mamake (ground), the mauka corner of Waipunalei.* This is as far as I know the boundaries.

I have heard that Laupahoehoe bounds it to Pukoa, and there Papaaloo bounds it. Pukoa is just inside of the mauka edge of the woods. I have not heard that in older times Kaiwilaihilahi, Piha on Nanue reached to Humuula. Have heard from old people that in olden times Maulua, Hakalau, Makahanaloo, and Piihonua reached to Humuula. Have not heard about Papaikou and Paukaa joining Humuula. I have heard that in olden times if Humuula people caught birds in the ohia woods, Piihonua took them away, and if Piihonua people caught birds on mamani, Humuula people took them away from them. [Volume B, page 48]

I have heard this from the bird catchers of Humuula and from our place. Have never seen the boundaries on the Kau side of Humuula. Kaohe bounds Humuula on the *mauka* side. Heard in olden times Kaohe cut Humuula off at the upper edge of the *mamani* on Mauna Kea, but I do not know about it... [Volume B, page 49]

Naaikauna*^K *Sworn.

I was born at Humuula and have always lived there. Born at the time of Kiholo [ca. 1810] know a part of the boundaries of Humuula. My father Eekamoku and his father Kaapunini told them to me. Humuula is bounded at shore on the Hilo side by Kahoahuna 2nd at Kaahupuaa...

Waipunalei joins Humuula at the waterfall [on Wai'ōpae Gulch]. Thence up across the land to the Hamakua side of Waipahoehoe, a gulch with water in it; thence up the road to *Pihahalei a kauhale near the mauka edge of the woods, and the mauka corner of Waipunalei, where it is cut off by Humuula and Laupahoehoe runs toward Hamakua, and bounds Humuula to Puukole; mauka of hill can be seen the pili from the hill. Palipali of Humuula is mauka of the woods. There Papaaloa bounds Humuula to Puukoa, a hill in the woods near the mauka edge. There Maulua joins Humuula and bounds it to the mauka side of Puulehu, a hill in the woods, makai of Kaiiaki, a kauhale on Humuula close to the mauka edge of the woods (about as far as from the Court House to the shore). The pili and mamani run an open spot close to this hill. There are points of ohia that run a good ways mauka there on Humuula.* [Volume B, page 50]

If we went from Kaiiaki to Puulehu and were caught we had to give the birds to mauka people. Maulua extends from Puulehu to Uhakunou a kualapa running from the pili into the woods. Thence I was told that Piha bounds Humuula to Kawauwauwai water holes in and close to the mauka edge of the woods; it is also a kauhale. Kalapaohelo is a point on Humuula above the woods. Thence along Piha to makai of Kaluaalu, on Humuula at Ohiamalumu, an ohia tree... [Volume B, page 51]

CX'd.

In olden times the road from Humuula to Laumaia went along on the pili and not through the woods. I used to go into the woods a short distance catching birds, and then go back outside again. [Volume B, page 52]

Commission adjourned until 10 o'clock a.m. November 7th 1873.

R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit

Boundary Commission met according to adjournment. At the Court House at Hilo November 7th 1873

Present: E.G. Hitchcock and D. Alapai.

***Waikililii*^K. Sworn.**

I was born at or near Humuula, district of Hilo, and have always lived in said district. I have often been on the mountain catching bullock, and know the boundaries of Humuula at shore. When I was on the mountain I was told that the boundary on Mauna Kea between Kaohe and Humuula was where the *mamani* ceases to grow, and that the *pukeawe* is on Kaohe... *Have always heard that Humuula takes the pili and mamani. I have been told that if our kupuna caught birds on ohia trees, Piihonua people took them away; and that if Piihonua folks took the birds from the mamani, our kupuna would take them away from them. In olden times we did not hear of Humuula cutting off Hilo lands in the forest, but at the edge of the forest. Never heard of any road running from Humuula to Piihonua through the woods in olden times.*

The old road has never been pointed out to me. I have not been with *kamaaina* along above the woods, and had the lands pointed out to me... [Volume B, page 53]

***Kamaipiialii*^K. Sworn:** [owner of Royal Patent Grant No. 1032 at Welokā]

I was born at Maulua, and now live there. Maulua is cut off by Humuula and I have always been told that it joins Piha.

Was told by old people that Maulua is cut off by Humuula at Kapulehu. I have been there once. Do not know how wide Maulua is *mauka*. I do not know where Piha joins Humuula. CX'd... [Volume B, page 54]

Waipunalei Ahupuaa (1875)

**District of Hilo, Island of Hawaii,
Boundary Commission, Hawaii, Volume A, No. 1 [pages 251-252]**

Waipunalei, District of Hilo
Hilo, August 22d, 1873

To The Honorable R.A. Lyman, Commissioner of Boundaries for The Third Judicial Circuit, to wit: the Island of Hawaii, Hawaiian Islands

The petition of Thomas Spencer of Hilo, Island of Hawaii, Hawaiian Islands, respectfully represents as follows, that the undersigned petitioner is possessed of a tract of Land called the *Ahupuaa* of Waipunalei, that the aforesaid Land or *Ahupuaa* of Waipunalei was deeded to C.N. Spencer of Waiohinu, Kau, Hawaii, by one I.R. Kaahu of Honolulu, Island of Oahu, by name only and not by survey, and that the Boundaries of the same are as yet undefined; that the following is the list of lands adjoining the said land of Waipunalei, and the owners of the same, as far as the same are known by our petitioner, to wit [Volume A, No. 1, page 251].

Haakoa, Government Land
Nakapaa, Government Land
Humuula, Crown Land

That all and singular the premises are within the jurisdiction of this Honorable Commissioner of Boundaries.

Wherefore your petitioner respectfully prays that the boundaries of the said land, called the *Ahupuaa* of Waipunalei, may be decided and certified to, by your Honor, the Commissioner, and that a Certificate defining the said boundaries may be issued to your petitioner, and that to this end a day, hour and place may be appointed for the hearing of this petition, and the proofs there and then adduced, and that due notice according to law may be made to all persons interested in the said matter, to appear and show cause, if any they have, why the said petition should not be granted.

And Your petitioner will ever pray, &c, &c, &c,
(signed) Thomas Spencer

For Testimony see Folio 365, Book B. [Volume A No. 1 page 252]

Waipunalei Ahupuaa

**District of Hilo, Island of Hawaii,
Boundary Commission, Hawaii, Volume B [pages 365-370]**

The *Ahupuaa* of Waipunalei, District of Hilo, Island of Hawaii, 3rd Judicial Circuit

On this, the 24th day of February A.D. 1875, the Commission of Boundaries for the Island of Hawaii, 3^d Judicial Circuit met at the Law Office of E.G. Hitchcock in Piihonua, Hilo, Hawaii on the application of Thomas Spencer, for the settlement of the boundaries of Waipunalei, situated in the District of Hilo, Island of Hawaii. Due notice of hearing personally served on E.G. Hitchcock, Attorney for Commissioners of Crown lands.

The applicant requested that D.H. Hitchcock's [testimony] be taken, as he is to leave for Kona, and will be absent about 2 months. Wishes to have evidence in reference to survey taken, and evidence of other witnesses taken when notice of hearing has been

served on all interested parties, as he wishes to have as little delay as possible in settling boundaries.

For Petition see Folio 251, Book A.

Testimony

D.H. Hitchcock, sworn:

I surveyed the land of Waipunalei last January [Figure 13]. An old man named Paka was my *kamaaina*. He went with me and pointed out the boundaries. The notes of survey filed are made out from my field notes, made when I was surveying the land. I also questioned Naaikauna *oopa* in reference to the boundaries of the land, and he gave the same boundaries as Paka told me, from the shore, until we reached the point in the woods, that he claimed was the place where Humuula cut Waipunalei off. I do not remember the name of the place, but think it is opposite the place called Kaukahoku. Naaikauna said that Paka was a good *kamaaina* of the land, but disputed the *mauka* boundary given by Paka. I surveyed to the point given by Paka, as he seemed to be a *kamaaina* that knew the boundaries.

Cross-examined.

Case continued until further notice.

R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit

Hilo, March 6th 1875

The Boundary Commission met at Law Office of E.G. Hitchcock, **Piihonua**, Hilo, after due notice to interested parties.

Present: T. Spencer, the applicant, and E.G. Hitchcock for Commissioners of Crown Lands.

For testimony see next page [Volume B, page 365].

Waipunalei, Hilo, Continued:

Paka^K Sworn (quite an old looking man, looks to be 70 years):

Says: I was born at Waipunalei, Hilo, Hawaii, at time of Kiholo *mua* in 1804. I now live at Laupahoehoe, Hilo. Know land of Waipunalei, and am a *kamaaina*, and know its boundaries.

I lived there 40 years, have lived in Laupahoehoe for 16 years, and have lived several years in different [places]. My brother, Keaniho, who used to live at Ponohawai, Hilo, and was drowned in the Wailuku River, showed me the boundaries of the land, when we were in the woods together catching birds.

Waipunalei is bounded on the Hamakua side at the sea shore by the land of Kuaia, and on the Hilo side by the land of Hakoa [Ha'akoa]. *The boundary at the shore between this land and Hakoa, is at a resting place on top of the pali called Puupoohina. Thence the boundary between these two lands runs mauka along an old trail to an oioina called Kalupeakawaiwa; this point is a short distance mauka of the Government road. Thence up old trail to oioina called Mamala. Thence up to Pooholuaakahi; Thence up to Pooholuaelua, old kauhale, where I stopped with Hitchcock when he was surveying the lands. Thence into the woods along old trail to Kalaikukui; thence to Waipahoehoe gulch, the mauka corner of the land Hakoa. Thence the boundary runs mauka along gulch Waipunalei being on the Hamakua side of the gulch and land Laupahoehoe laying on the*

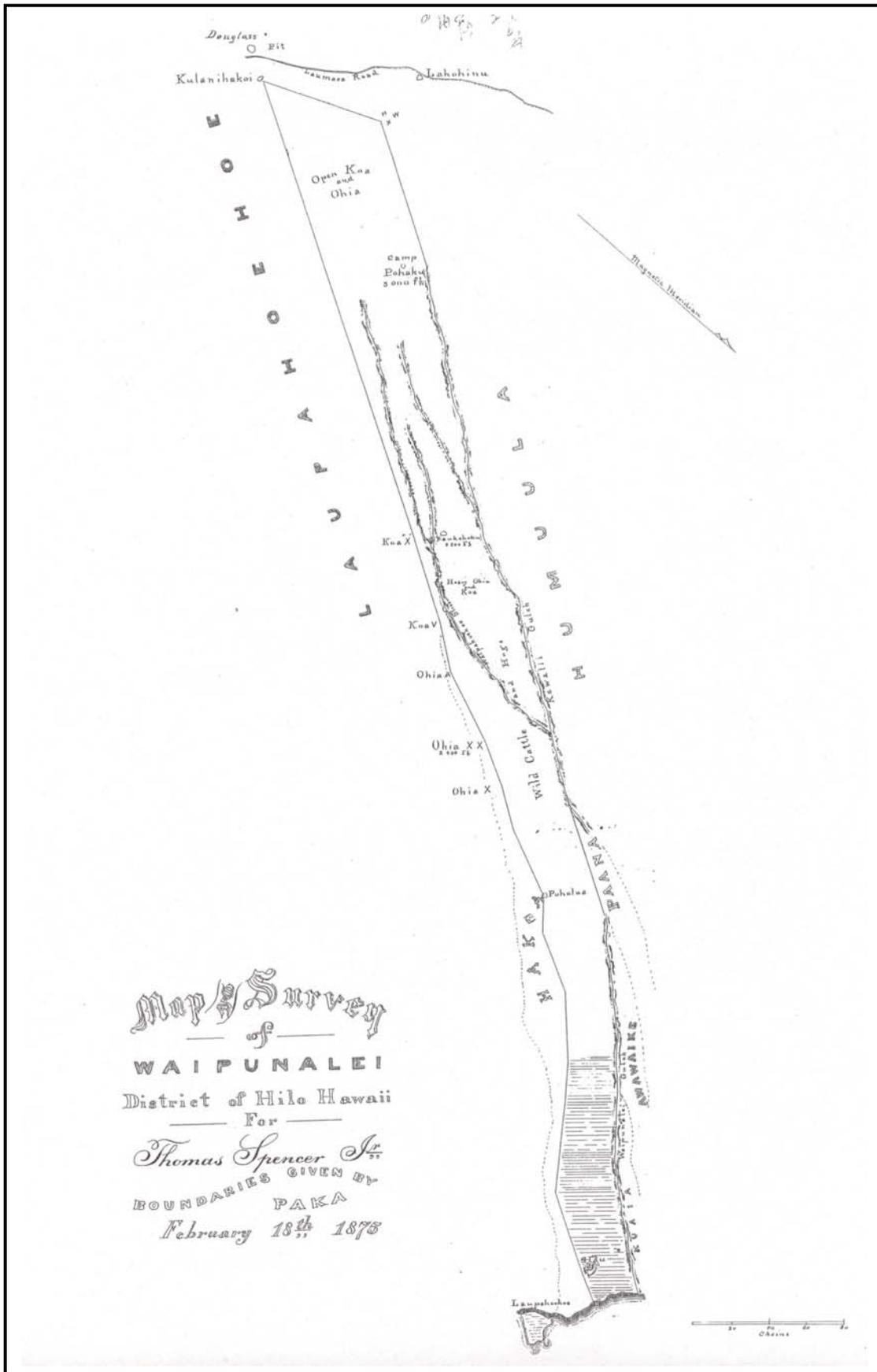


Figure 13. Reduction of Register Map No. 668 – Land of Waipunalei (D. Hitchcock, 1875)

Hilo side of the gulch, to the upper edge of the woods. The gulch is very small near the upper edge of the woods. A place called Kulanihakoi, a water hole is the mauka corner of Waipunalei. It is at the upper edge of the ohia forest. The koa and mamani trees above this place are on the land of Humuula. Thence the boundary runs along Humuula towards Hamakua to place called Napalua, an old resting place where there are two koa trees.

Thence boundary runs towards the sea along Humuula to a large *koa* tree called Umiolai Kaahumanu; thence boundary runs down old trail to Puuhaalulu; Thence *makai* to Pihahalei, old *kauhale* that is about as far *makai* of camp Pohaku as it is from where we now are to Halai hill. Thence *makai* to Hilo side of Kehau gulch; Thence to Kamaki, old *kauhale*; thence along side of gulch to Kalelepali, a *pali* of the gulch, the *mauka* corner of land of Paana; Thence leaving gulch to junction at *mauka* corner of Awawaike land; Thence boundary runs *makai* in *awaawa* along small lands, Kuaia boundary being an *awaawa* to shore. Bounded *makai* by sea.

I went with D.H. Hitchcock when he surveyed the land, and pointed out the boundaries to him. He surveyed the lands to the places I pointed out. I was the only *kamaaina* along. Hoakimoa was along with us. [Volume B, page 366]

Waipunalei, Hilo, continued

CX'd.

Keawekuaia, an old *kamaaina* of the land also pointed out the boundaries to me. Keaniho was my own cousin and was *Konohiki* of the land, when he pointed out the boundaries. I went three times to *Kulanaihakoi*, the road ran up the middle of the land. *Waipahoehoe* gulch runs up to *Kulanaihakoi*. I pointed out the gulch to Hitchcock. No *ohia* trees (or forest) above this place. The *ohia* woods are a short distance *makai* of it. You can tell where Napalua is; there are *koa* trees there, also a *kualapa* that runs some distance *makai* to a very large *koa* tree called Umio Kaahumanu; There the *kualapa* ends, and boundary of this land runs *makai* along *kahawai* and *awaawa* that has no name, the land of Humuula being on the Hamakua side of *awaawa*; *Makai*, the *awaawa* is called Kawalii. *Waipahoehoe* is a branch of Kawalii.

The junction of the gulches is called Olohekahawai. The land of Waipunalei does not reach to the junction of these two gulches. The Kawalii gulch ends at place where ten small gulches unite, and the place is called Lapapa. Kalupeakawaiwa is on the Hilo side of land. The boundary of Waipunalei ceased to join land of Humuula at Kalelepali, a high waterfall in the gulch. It is the *mauka* corner of Paana; Thence the boundary runs *makai* to Mahana *awaawa*, the *mauka* corner of Awawaike.

This *awaawa* comes from on Waipunalei, and runs onto Awawaike; Thence the boundary runs down to a ridge, and along ridge to Waianipoa, a hole where water stands, when it rains; Thence boundary runs along land of Kuaia and along *awawa* to shore. None of the Humuula *kamaaina* were present when the survey was made. We marked a good many trees on the boundary as we surveyed the land.

J.J. Porter, sworn, says:

I lived at Laupahoehoe, Hilo from 1857 to 1860; went back there in 1861 and remained there till the year 1866. I know the land of Waipunalei, and have had the boundaries of it pointed out at the Government road, from the bullock pen on one side to the *hau* bushes on the other side. I do not know the other boundaries below the woods or in the woods. I have heard from Frank Davis and Jack Anderson who formerly lived at place called Lahohinu above the woods that the land Waipunalei ended just *makai* of that place, and

that the bark house they lived in stood on the *mauka* end of Waipunalei. They used to come to my place about every week. Those two men are both dead. When Blodgett was surveying Humuula, he stayed at my house at Laupahoehoe for two days, and I understood him to say that Waipunalei extended to Lahohinu. I have not heard where the other boundaries of the land are.

CX'd.

Have never heard Waikii, Naaikauna or Kahue say anything [Volume B, page 367] about the boundaries of this land. They lived at the shore on Humuula some way from Laupahoehoe. I do not know who owned Waipunalei at that time. *We used to get pulu from the land, but do not know what part of the land it was picked on. Captain Elderts was the Luna of our Pulu gang at that time, and lived in the woods.*

Hoakimoa^K Sworn, says:

I was born at Koholalele in Hamakua, Hawaii, and am now 34 years old. I know the land of Waipunalei, and have had the *mauka* boundaries and part of the *makai* boundaries pointed out to me. Waiki 1st of Humuula pointed out the boundaries to me at the time Abel Harris was picking *pulu*, and having bullock shot on Waipunalei. I was shooting wild bullock for Harris and Waiki Nui went to Lahohinu and pointed out the boundaries to me. *He pointed out a place called Kulanaihakoi as the mauka boundary of Waipunalei and Laupahoehoe. This place is makai of the Douglas pit (where Douglas lost his life); Humuula cuts these lands off there. The mauka corner of Waipunalei on the Hamakua side is at a kualapa on the Hilo side of Lahohinu. The koa trees and ohia are growing at this place, and the mamani a short distance mauka at place called Kailaua. A short distance makai of this kualapa, the boundary between this land and Humuula runs into a gulch, that runs makai into the Kawalii gulch. Waipahoehoe gulch is in the middle of Waipunalei. Waiki told me that the Palipali gulch was the boundary between Waipunalei and Laupahoehoe.*

CX'd.

The boundaries were pointed out to me over 15 or 17 years ago. It was during Liholiho's reign (Kamehameha IV). It was some time before Humuula was surveyed.

I do not know where I was at the time Humuula was surveyed. Porter was living in Laupahoehoe at the time Abel Harris sent Waiki to point out the boundaries, and Frank Harris was staying there with him. I was shooting wild bullock there for Harris about three years. When I was living at Kulanaihakoi, I was arrested and taken to Honolulu for shooting bullock on Humuula; was tried at the Circuit court at Waimea and cleared by Waiki's evidence, that "I was on Waipunalei, and not on Humuula. I think that it is over a mile from Kulanaihakoi to Douglass' pit.

J.J. Porter for applicant, asks that evidence given by J.A. Simmons, and J. Parker November 3d 1873, as to boundary of Humuula cutting off other lands at the *mauka* edge of woods be copied as evidence as to the land of Waipunalei reaching to *mauka* edge of woods.

Granted... [Volume B, page 368]

[See testimony in proceedings of Humu'ula, above.]

Decision

The Boundaries of the *Ahupuaa* of Waipunalei, decided to be as given by Paka, and in notes of survey filed.

Certificate issued according to the notes of survey. Notice of decision given.

Hilo, Hawaii, July 21st 1875

R.A. Lyman, Commissioner of Boundaries 3d Judicial Circuit

Notice of Appeal given by Attorney for Agent Crown Lands *mauka* Boundary.

R.A. Lyman

No. 76, For Certificate of Boundaries see Folios 159 & 160, Liber I.

Appeal not perfected to date

Hilo, Hawaii, August 21, 1875

R.A. Lyman, Commissioner of Boundaries 3d Judicial Circuit

Costs paid in full, see Folio 160, Liber I. [Volume B page 370]

Waipunalei Ahupuaa

District of Hilo, Island of Hawaii,

Boundary Commission, Hawaii, Volume 1, No. 3 [pages 159-160]

No. 76.

Certificate of the Boundaries of Waipunalei, District of Hilo, Island of Hawaii, 3d Judicial Circuit.

Upon the application of Thomas Spencer, and by virtue of the authority vested in me by law as sole Commissioner of Land Boundaries for the Island of Hawaii, 3d Judicial Circuit, I hereby decide and certify the boundaries of the *Ahupuaa* of Waipunalei, situated in the District of Hilo, Island of Hawaii, to be as hereinafter set forth.

Given under my hand at Hilo, Hawaii, this Twenty-first day of July A.D. 1875.

R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit

Boundaries of Waipunalei.

Commencing at a point on the sea coast immediately over two large rocks on the beach, one almost out of the water, and about square [diagram in original]; the second one stands in the water shaped thus [diagram in original]. A large rock off Laupahoehoe and separate from the other rocks bears North 67° East. The East point of Kaupo Gap on Maui bears North 59° West from this point. The land of Hakoia lays on the south side of this land. Thence South 13° West 24.00 chains along boundary of [Volume 1, No. 3, page 159]

Hakoia to *hau* Grove, Thence:

South 30° West 40.00 chains;

Thence South 48° West 70.00 chains to woods;

Thence South 40 ½° West 37.00 chains;
Thence South 23 ½° West 35.00 chains to place called Pooholua;
Thence South 44° West 20.00 chains;
Thence South 20° West 38.00 chains to 2 *ohia* trees marked XX;
Thence South 29° West 26.00 chains;
Thence South 22° West 27.00 chains to *koa* tree marked V;
Thence South 20° West 42.00 chains to place called Waipahoehoe;
Thence South 34° West 27.00 chains to *mauka* corner of Hakoa;
Thence South 27° West 48.00 chains along boundary of land of Laupahoehoe to a *koa* tree marked X;
Thence South 26 ½ ° West 26.00 chains along Laupahoehoe to place called Kulanihakoi;
Thence North 23° West 60.00 chains along land of Humuula to place where 3 *koa* trees stand marked W., H. and X;
Thence North 29° East 77.00 chains along Humuula;
Thence North 32 ½° East 153.00 chains along Humuula;
Thence North 16° East 42.00 chains along Humuula;
Thence North 30° East 115.00 chains along Humuula;
Thence North 26° East 65.00 chains along land of Paana;
Thence North 40° East 91.00 chains along land of Awawaiki;
Thence North 44 ½° East 44.00 chains along land of Kuaia to a *kukui* tree marked X;
Thence North 34° East 70.00 chains along land of Kuaia, and Waipunalei *Awawa* to sea coast and Containing an area of 2520 acres.

R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit
Surveyed by D.H. Hitchcock

Maulua Nui Ahupuaa (1895)
District of Hilo, Island of Hawaii
Boundary Commission Volume A, No. 1, pages 232-233

Honokahau, District of Kona
Maulua, District of Hilo

Honolulu, August 4th, 1873

(Copy)

To the Honorable Rufus A. Lyman,
Commissioner of Boundaries for the island of Hawaii, Hawaiian Islands

The petition of A.F. Judd of Honolulu, Island of Oahu, Hawaiian Islands, Administrator of the Estate of the late Honorable G.M. Robertson, deceased, respectfully represents as follows:

That the Board of Commissioners to Quiet Land titles did on the first day of May A.D. 1866 by Award No. 11216, Apana 36, Grant to M. Kekauonohi, the Ahupuaa of Honokahau, situated in the District of Kona, Island of Hawaii aforesaid, and also did grant to the said M. Kekauonohi by the same Award Apana 45, dated on the [illegible]day of August A.D. [illegible] [page 232] the Ahupuaa of Maulua situated in the District of Hilo, Island of Hawaii aforesaid, and the said G.M. Robertson, deceased came into the possession of both the above named *Ahupuaa* by Deeds of Conveyance from the Administrator of the Estate of the late L. Haalelea, deceased, devised of the said M. Kekauonohi, dec'd.

That the said Ahupuaas have not been awarded by the Land Commission and patented or conveyed by deed from the King by boundaries described in such award, Patent or deed, and therefore your Petitioner respectfully requests that the boundaries of said Ahupuaas, may be settled by your Honorable Commission, and to that end makes this application, to have the same decided and certified by you, as Commissioner of Boundaries as aforesaid.

Pursuant to the requirements of the Statute your petitioner represents that the following are the names of the adjoining lands, and the names of the owners of the same, so far as known to your petitioner, to wit:

Of Honokahau
Kaloko & Honokahauiki

Of Maulua
By Kapehu, Humuula, Piha &c.

And so your Petitioner pray that a day and an hour may be appointed by your Honor the Commissioner for the hearing of this application and that all parties interested may have notice and your Petitioner will ever pray &c.

(sig) A.F. Judd,
Administrator with will annexed,
Est. of G.M. Robertson [Vol. A, No. 1, page 233]

***The Ahupuaa of Maulua Nui
District of Hilo, Island of Hawaii
Boundary Commission, Hawaii, Volume B, page 353***

[Annexed at end of record for Maulua iki]

Notice for the settlement of the Boundaries of the Ahupuaa of Maulua Nui, Hilo, Fourth Judicial Circuit, Hawaiian Islands.

On reading and filing the petition of A.B. Loebastien, Atty. for George Robertson and owners of Maulua Nui, in the settlement of the Boundaries of Maulua Nui. It is ordered that Saturday, the Fifth day of January A.D. 1895 at 10 o'clock a.m. be and hereby is appointed for hearing said Petition, and evidence as to Boundaries of said land, in the Police Court Room at Hilo, Hawaii, at which time and place all persons concerned may appear and give evidence as to Boundaries of said land.

Dated, Puna, Hawaii, H.I., Decb. 1, 1894.
Rufus A. Lyman
Com. of Boundaries, Third and Fourth Judicial Circuits. [Volume B, page 353]

Maulua Nui Ahupuaa
District of Hilo, Island of Hawaii
Boundary Commission, Hawaii, Volume D, pages 87-91

In Re. Boundaries of the Land of Maulua Nui, Land Commission Award 11216, District of Hilo, Island of Hawaii, 4th, J.C., H.I.

Court House, Hilo, Hawaii,
Dec. 5th 1894, 10 a.m.

Application of A.B. Loebenstein, Atty. for G. Robertson and Owners of the *Ahupuaa* of Maulua Nui, filed December 1, 1894 and hearing for settlement of Boundaries of said land was set for 10 a.m. of today by Notice published for three weeks in the Hawaiian Gazette, December [illegible] 1894 to December [illegible] 1894. Also in Kuokoa [illegible]...

And notice personally served on the Owners of adjoining lands, as far as known.

Present: Keliipuleole and filed Grant 3651. RP

Present: Muhonua and filed Grant 1032. RP

Present: Muhonua and filed Grant 2575. RP

The Commissioner of Boundaries for 3d & 4th J.C., H.I., having received a letter from J.F. Brown of Honolulu dated Dec. 17, 1894, stating that he was to represent Haw. Govt. and probably Agent of Crown Lands at hearing for settlement of Boundaries of Maulua Nui, and requesting that the Hearing for settlement of Boundaries be put off until after the arrival of the Kinau at Hilo on Jan. 10th 1895, the hearing is adjourned until 1 p.m. January 10, 1895.

Rufus A. Lyman
Com. of Boundaries, 3d & 4th J.C., H.I.

Hilo, Hawaii, Jan. 10th 1895, 1 p.m.

The Str. Kinau not having arrived from Honolulu, Oahu, the hearing is adjourned until after the arrival of the mail from Honolulu, Oahu, when notice will be given to interested parties.

Rufus A. Lyman
Com. of Boundaries, 3d & 4th J.C., H.I.

Hilo, Jan. 14th 1895

The following letter was received Jan. 13th 1895

Honolulu
Jan. 9th 1895 [Volume D, page 87]

F.S. Lyman
Bdy. Commissioner

Dear Sir:

The exciting events in Honolulu and the general need of the Govt. of its supporters prevents my leaving by this steamer as I had supposed. May I ask of Maulua case until next Kinau.

Yours truly,
(Sig.) J.F. Brown
Govt. Survey Assistant

No fears need be felt of the ability of Govt. to control the situation.

On account of the rebellion in Honolulu, Oahu, the Commissioner of Boundaries deems the above request a reasonable one, and after due notice to A.B. Loebenstein, Atty. for G. Robertson and Owners of Maulua Nui, continues the hearing for settlement of Boundaries until 10 a.m. Tuesday, Jan. 22d, 1895.

Rufus A. Lyman
Com. of Boundaries, 3d & 4th J.C., H.I.

Hilo, Hawaii, January 22, 1895, 10 a.m.
By request of A.B. Loebenstein, attorney for Owners of Maulua Nui, and J.F. Brown, Assistant Government Survey, the hearing is continued until 10 a.m. January 23d, 1895.

Rufus A. Lyman
Com. of Boundaries, 3d & 4th J.C., H.I. [Volume D, page 88]

Court House, Hilo, Hawaii,
10 a.m. Jan. 23d, 1895.

Commission sat according to adjournment from the 22d inst. Present: A.B. Loebenstein, attorney for G. Robertson and Owners of Maulua Nui; and J.F. Brown, Government Survey Asst. for the Hawaiian Govt. and Agent of Crown Lands...

Maulua Nui
List of adjacent lands & Owners
Maulua Iki,
Puu Ohai,
Pohakupuka,
Manoloa,
Puu Ohua, Hawn. Government
Piha,
Humuula,
Laupahoehoe &c,
Kaiwilahilahi,
Kapehu,
Weloka [Volume D page 89]

Grant 1032, Weloka Kamaipiialii;
Grant 2575, [Weloka] Kua;
Section 1, 2, 3, Maulua Iki Keliipuleole & Laup. Sug. Co.

A.B. Loebenstein filed Notes of Survey & Map of Maulua Nui.

A.B. Loebenstein, Sworn;
I surveyed the land of Maulua Nui, and made request, as Atty. for the Owners of the land, for the settlement of the Boundaries. There being no old residents on the land, I was obliged to seek most of my information from records on file in Govt. Survey and Govt. Land Offices.

Maulua Nui is entirely surrounded by Government lands, except a small portion, on Maulua Iki near the sea coast, lately sold by Govt., and on West or Hamakua side there are two grants from sea shore, No. 1032 Kamaipiialii, and No. 2575 Kua on Weloka. I

made the survey for that portion of the land conform to boundaries as given in those Grants.

On the East or Hilo side of land I surveyed from *mauka* end of Grants along several different lands until came to land of Piha, and ran along that land to certain points fixed by Certificate of Boundaries of Piha, No. 64, Bk. No. 3, page 124. The *termini* were fixed by that Certificate, but courses were not right.

In settlement of other points I followed suggestions given by C.J. Lyons of Govt. Survey, assisted by J.F. Brown. The map and Notes of Survey filed, are in accordance with the changes recommended [sic] by Govt. Survey.

The land ends at old trail above woods to Laumaia. The upper edge of woods is not well defined, and I have fixed a straight line for the boundary between Maulua Nui and Humuula, instead of following windings of old trail. I found pile of stones made by D.H. Hitchcock at corner of Piha, and Maulua adjoining Humuula when he surveyed Piha, and pointed out to him by Ku.

Note: (Ku was the old *kamaaina* of Honohina & Piha when they were surveyed and boundaries settled.)

CX'd. By J.F. Brown.

I think I have fixed corner of Laupahoe- [Volume D, page 90] hoe a little in favor of the Government, as there was a good place there to establish corner of these lands on boundary of Humuula. I made a straight line along lands of Weloka and Kapehu from the lower edge of the woods, as advised by Govt. Survey, instead of following old trail. I do not know of any grant on Kapehu that bounds Maulua Nui. The Notes of Survey I have filed are copied from my original notes that were forwarded to Govt. Survey Office. I found it impossible to locate all points of boundaries as Certified to in Certificate No. 69 of Manoloa and certificate of Boundaries [____ blank] of Maulua Iki, as surveys were incorrect.

J.F. Brown, on part of Haw. Govt. and Agt. of Crown Lands, that as far, as he represents them, he accepts the boundaries as given in Notes of Survey filed today. And that in view of difficulty of locating boundaries as Certified in Certificate of Manoloa and Maulua Iki, the Govt. accepts the boundary as given in Map and Notes of Survey as now filed.

The Com. of Boundaries finds that the *Ahupuaa* of Kapehu was Awarded and RP issued by Survey. Cannot find that any Certificate of Boundaries was ever issued for land of Maulua Iki.

Decision

The Boundaries of Maulua Nui are decided to be as given in Royal Patents of adjoining lands, and Notes of Survey filed today, and Certificate of Boundaries issued as of today.

Rufus A. Lyman
Com. of Boundaries, 3d & 4th J.C., H.I.

J.F. Brown, Government Assistant Survey writes January 28, 1895, I find Royal Patent of Kapehu, Land Commission Award 2289 is near Kaupakuea and not Maulua.

For Certificate of Boundaries see No. 170, Book C, No. 4, Folio 87 [Volume D, page 91]

***Maulua Nui Ahupuaa
District of Hilo, Island of Hawaii
Boundary Commission, Hawaii, Volume C, No. 4, pages 87-89***

No. 170

Certificate of Boundaries of the Land of Maulua Nui,
District of Hilo, Island of Hawaii, 3d & 4th, J.C., H.I.

Land Commission Award 11216 [Mikahela Kekauonohi]

Commission of Boundaries, 4th Judicial Circuit,
Rufus A. Lyman, Esq. Commissioner.

In the Matter of the Boundaries of the Land of Maulua Nui,
District of Hilo, Island of Hawaii, 3d & 4th J.C., H.I.

Judgment

An application to decide and certify the Boundaries of the Land of Maulua Nui, District of Hilo, Island of Hawaii, having been filed with me on the first day of December 1894 by A.B. Loebenstein, Atty. for Geo. Robertson and owners of Maulua Nui, in accordance with the provision of an Act to facilitate the settlement of Boundaries, Act No. [illegible] approved October 27, A.D. 1894; now therefore, having duly received and heard all the testimony offered in reference to the said boundaries, and having endeavored otherwise to obtain all information possible to enable me to arrive at a just decision, which will more fully appear by reference to the records of this matter by me kept in Book No. 5, D, page 87 and it appearing to my satisfaction that the true, lawful and equitable boundaries are as follows, viz.:

Beginning at an iron pipe set in the ground on the West bank of the Makualoi gully near its mouth, from which point the Hawn. Government Survey [diagram] 2nd, Station "Lone Hala" bears S 48° 15' East true distant 3774 feet, the boundary runs by true bearings:

1. S 44° 50' W 2110 feet along Gr 1032, Kamapiialii and Gr 2575 Kua, on Weloka to the head of the Makualoi gully, the boundary line following the middle of the gully to said point.
2. S 51° 11' W 3397 ft. along Gr 2575 – Kua & the Govt. land of Weloka to a concrete block on hill called Maemae, from which point the Hawn. Govt. Survey [diagram] Station Puu "Ohai" bears S 70° 52' 10" E true distant 7214.5 ft.;
3. S 53° 24' W 2098 ft. along Weloka to concrete block at lower edge of woods [Volume C, page 87]
4. S 52° 45' W 4753 ft. along Weloka to *ohia* [diagram] standing at lower edge of ditch;
5. S. 39° 16' W 10260 ft along Weloka and Kapehu to an *ohia* tree marked [diagram] on a high point of the Maulua ridge called Kamaloha, said tree bearing from the Hwn. Govt. Trig. Station "Puu Ohai" S 62° 45' 50" W distant 21189 feet;
6. S. 56° 41' W 11722 ft. along Kapehu and Kaiwilaihilaihi [Kaiwilahilahi] to the upper end of Maulua ridge at old Kauhale called "Kulipalapala";
7. S. 72° 3' W 23626 ft. along Government lands of Kaiwilaihilaihi and Papaaloha, to the Northwest angle of Maulua Nui, at a pile of stones

standing a little East of the Laumaia & Hope-a trails, midway between the same and a *koa* tree marked [diagram], the Hawn. Govt. Survey [diagram] 2nd Station "Kaiiiki" bearing S 18° 29' W true, distant 525.7 ft.;

8. S 10° 37' E 6208 ft. along Govt. land of Humuula, to a point on the East or *makai* edge of the Laumaia & Hope-a trails; just below an ancient *Ahupuaa* of stones, standing in the middle of the sand flat called Kahuwai, at the base of the Lapaohelo ridge;
9. N 78° 08' E 29931 ft. along Govt. land of Piha to a high knoll called "*ahua o na ohia nana mauna*," [hillock of the '*ōhi'a*' trees from which to look at the mountain] distant about 2000 feet West or *mauka* of the crater of "Mokupuupuu," this station being marked by an *ohia* tree on which is cut [diagram] and which bears from the Hawn. Govt. Survey [diagram] Sta. "Puu Kalepa," S 87° 31' 30" E true distant 39750.6 feet;
10. N 37° 37' E 16410 ft. along Govt. land Puuohua to a natural divide in the Manoloa stream called "Kapuiwai o Manoloa," being the head of the land of Manoloa;
11. N 2° 20' W 3962 ft. along head of the Govt. lands of Pohakupuka and Maulua Iki to a point in the Makaliiloa gulch, 150 feet above the Hoowanawana falls;
12. N 48° 42' E 8757 ft. along Govt. land Maulua Iki, the boundary following the middle of the gulch to the precipice overhanging the Kaaliali falls; [Volume C, page 88]
13. N 32° 53' E 1250 ft down said falls to junction of Makaliiloa stream with main Maulua stream;
14. N 40° 40' E 2655 ft. down middle of Maulua stream and up bank of same to large rock pillar called Pohakuloa at West angle of Sec. 3, Grant 3651, Maulua Iki;
15. N 25° 18' E 710 ft. along said Grant to West angle Gr. [left blank];
16. N 25° 18' E 1024 ft along said Grant to flat rock marked [diagram] at East or *makai* edge of Govt. road that angle of Sec. 1, Grant 3851;
17. N 25° 18' E 570 feet along Sec. 1, Grant 3651 Maulua Iki to its North angle at high water mark of sea coast, said point bearing N 14° 29' East "true" from a large rock called Pohakuloa, distant 84 feet, from same;
Thence following the windings of the sea coast X at high water mark to the foot of the bank opposite and to the Initial Point which bears from the last station;
18. N 25° 20' W 1505 ft.

Containing an area of 9288 acres.
(as surveyed by A.B. Loebenstein)

It is therefore adjudged, and I do hereby decide and certify that the Boundaries of the said land are, and hereafter shall be as hereinbefore set forth.

Given under my hand at Hilo, Island of Hawaii, the Twenty-third day of January A.D., one thousand eight hundred and ninety-five.

Rufus A. Lyman,
Commissioner of Boundaries, Third & Fourth Judicial Circuits, H.I. [Volume C, page 89]

FORESTRY PROGRAMS IN THE HILO DISTRICT (1904-1982)

In ancient Hawai'i, forests were valued as spiritual places, the abode of myriad gods and spirits; and a place to which people resorted in order to secure resources necessary to sustain life. Because of the spiritual associations of all facets of nature, people learned to tread with care, and exercised high levels of restraint and caution in the forests. In early 1800s, western business interests brought about a change in the way forests were viewed and resources collected. Large scale cutting of woods, such as *'iliahi* (sandalwood) for trade, and trees for fuel to supply ships and growing plantation interests, led to extensive clearing of once rich forests. By the middle 1800s, it was observed that increasing populations of introduced livestock (e.g. cattle, sheep, goats, and European boar) were causing the retreat of forest lands. On Hawai'i, the Hilo-Hāmākua lands around Mauna Kea were of particular concern. And though leases on Crown and Government lands included provisions for fencing and protection of forests, the destruction continued. So significant was the threat of wild animals to the Hawaiian landscape, that on September 19, 1876, King David Kalākaua signed into law an "Act for the Protection and Preservation of Woods and Forests." By that Act, the Minister of the Interior was authorized to set apart and protect from "damage by trespass of animals or otherwise, such woods and forest lands, the property of government...best suited for the protection of water resources..." (Hawaii Laws Chapter XXX:39). The Minister of the Interior was authorized to appoint a superintendent of woods and forests:

...who shall, under the direction of said Minister, enforce such rules and regulations as may be established to protect and preserve such reserved woods and forest lands from trespass. Said superintendent shall have charge of the construction of fences and barriers required to protect the said woods and forest lands, and shall be responsible for their being kept in good condition... (ibid.).

The above Act was further defined by an Act of the Legislature of the Hawaiian Kingdom, approved by Queen Lili'uokalani on January 4, 1893, which established the Bureau of Agriculture and Forestry. Among the Bureau's goals was the "preservation of forests" (Hawaii State Archives – Com 2, Box 11). On June 14th, 1900, the members and functions of the Bureau were absorbed by the Board of Commissioners of Agriculture and Forestry (Hawaii State Archives – Com 2, Box 11). The Board set about the task of establishing forest reserves on all the islands. In 1904, the Board of Agriculture and Forestry proposed development of the Hilo Forest Reserve, which was needed to "protect the headwaters of the streams, which play so important a part in the success of the various plantations" (Wm. Hall 1904:277; in Hawaiian Forester and Agriculturalist, 1909). On August 9, 1904, the Commissioners approved the recommendation that "all government and other lands in the district of Hilo, Island of Hawaii, lying above a line approximately 1750 feet above the sea, be set apart as a forestry reservation" (Hall, ibid:282). The lands extended from Laupāhoehoe to Pi'ihonua.

By 1909, the summit of Mauna Kea had been removed from the ranching leases, and Territorial Governor, W.F. Frear, approved the boundaries for the proposed Mauna Kea Forest Reserve. The following communications describe the thoughts behind establishment of the Hilo and Mauna Kea Forest Reserves, and some of the early actions on lands adjoining them. *Figure 14*, prepared in 1922, identifies the boundaries and disposition of the Hilo Forest Reserve Lands.

In 1904, the Board of Commissioners of Agriculture and Forestry, met on several occasions to discuss proposals to establish the Hilo Forest Reserve. The proposed reserve would extend from Kaūmana-Pi'ihonua (the 1881 lava flow) to Humu'ula, taking in the important forests and watershed lands. In 1904, the Hawaiian Forester and Agriculturalist (HFA) reported that the Board of Commissioners had formalized its' proposal, and identified considerations for establishment of the reserve; the reports also deliberated on the lower boundary line of the reserve.

Proposal and Description of Lands in the Hilo Forest Reserve

At the meeting of the Board of Agriculture and Forestry held on August 17, 1904, the following reports and recommendations were made public:

Report of the Committee on Forestry Honolulu, August 16, 1904

To The Board of Agriculture and Forestry:

Gentlemen: Your Committee on Forestry have had under consideration the subject of a permanent forestry reserve line in [page 275] the Hilo district, and also the petition of certain persons for homesteading certain Government land in Honomu, Hilo, Hawaii, now in forest.

The members of the committee are personally familiar with the general conditions existing in the Hilo district and the Superintendent of Forestry has visited and examined the localities in question, in detail, and presented to the committee full reports and recommendations.

These reports accompany this report, and we recommend their adoption.

In brief, the report of the Superintendent of Forestry is in favor of establishing a forest reserve line at approximately the 1750 foot level above the sea, varying to meet local conditions, as set forth in detail in his report. All above this line to be made a forestry reserve under the law of 1903. The upper boundary to be fixed later.

As to the Honomu homestead proposition, your committee is in doubt as to whether the establishment of homesteads in this locality is economically practicable or not. The land is over three miles from the government road. *The only road to it is a dirt one constructed by the Honomu plantation.* In the normal rainy weather of Hilo teaming is impracticable over such roads, and packing on animals is difficult and expensive. A macadamized road only is of use. This is costly to construct, and by reason of the steep grades, costly to keep in repair.

The available road funds have heretofore been scarcely sufficient to keep the one main road through the district in repair. It is questionable whether under existing financial conditions a macadamized road can be built or kept in repair, if built. A further consideration is, that the Hilo district is cut at such frequent intervals by ravines of such extreme depth that is impracticable to build an upper road above the plantations and parallel to the coast, as has been done in Kona.

A separate road must be built *mauka* on every ridge, or approximately every half mile or so. By reason of this fact the area opened by each road would be comparatively small—so small as not to warrant the cost of the road.

There are questions which, to some extent, lap over into the consideration which this Board must give every proposition to take forest land for homestead purposes. The main points upon which the committee bases its approval of the homesteading of [page 276] this land are: First, that the land itself is fair arable land, and, second, that deforestation under the restrictions recommended by the Superintendent, will not radically injure the purposes for which the forest reserve is sought to be established. The Board is not the responsible authority to decide upon the economical availability of the land for home-

steads, or concerning roads to get to them. That rests with the Land Department and the Legislature. The sole scope of this report is therefore, that so far as this Board is concerned, it does not object to utilization of the land in question for homestead purposes.

Respectfully submitted,

L.A. THURSTON,
A.W. CARTER,
W.M. GIFFARD.

***Report of the Superintendent of Forestry.
Honolulu, T.H., August 9, 1904.***

The Committee on Forestry, Board of Agriculture and Forestry.

Gentlemen:

I have the honor to submit herewith a report with recommendations on the proposed forest reserve, in the Hilo district, on the Island of Hawaii.

This report deals with the lower line of the proposed reserve and is the result of a visit to the district, covering the period from July 6th to July 23rd, 1904. During this time I, personally, went over the ground, following as closely as possible the lower edge of the existing forest, from the *Laupahoehoe gulch to the 1881 lava flow, back of Hilo town*. The examination was made in company with the managers of the several sugar plantations along the way; each manager accompanying me over his own land. Other gentlemen, also, were interviewed and much information in regard to local conditions, throughout the district, was obtained.

Object of Hilo Reserve

The reserve in the Hilo district is needed primarily to protect the headwaters of the streams, which play so important a part in the success of the various plantations. From *Laupahoehoe* to Hilo are many running streams, which thanks to the heavy and nearly continuous rainfall in the forests above, may be regarded as permanent, although of course subject to fluctuation. On these streams the plantations depend for water with which to flume their cane to the mill. Their importance is consequently [page 277] very great and the necessity of safeguarding them is apparent.

From its location and topography, the Hilo district is fortunately situated to receive an ample supply of water. The trade winds bring the moisture-laden clouds and pile them up against the slope of Mauna Kea, in a great bank, from which the precipitation is heavy and very nearly continuous. *This cloud stratum covers a belt, extending from an elevation of approximately 2000 feet to one of about 6000 feet*; these limits, of course, varying on different days and with the slight changes in the direction of the trade winds. The lower edge probably fluctuates more than the upper, as the cloud mass frequently creeps down the slope, causing heavy precipitation as far as the sea. But the greater part of the moisture from the clouds is dropped higher up—somewhere between the elevations of 2500 and 4000 feet.

The precipitation is heaviest at the eastern end of the district and gradually diminishes to the westward, until in the Hamakua district, permanently running streams are no longer found. The Hilo-Hamakua boundary is in this way a natural as well as an artificial line.

The reason for this change of conditions is that beyond the northern end of the Hilo district, the bulk of Mauna Kea no longer stands in the path of the trade winds, which accordingly go over the shoulder of the mountain carrying their clouds to the lands beyond.

From quite another cause the 1881 lava flow marks the limit of flowing streams to the eastward, for beyond this point toward Puna, the porous character of the rock and soil allows all the water to sink immediately into the ground, to appear again only near the coast.

At the western end of the Hilo district, the land rises much more abruptly from the sea than at the eastern—the same elevation being reached about four miles back of Laupahoehoe, which, back of Hilo, lies ten miles from the shore.

Whatever may be the influence of the forest on precipitation elsewhere in the islands, the question in the Hilo district is solely one of the conservation and utilization of the water, which reaches the ground. There is naturally great fluctuation in the size of the streams, and during times of drought, the beds of many of them are almost, if not entirely, dry. The presence of the forest tends to regulate and maintain the flow, and to make available for later use, the water which would quickly run away from denuded slopes. [page 278]

While the heaviest precipitation, as has been said, occurs somewhere above the 2000 foot contour line, the beneficial effect of the forest extends much lower down the slope. But after a time, other factors come into the case, making it necessary to establish a limit above which the land should remain in forest and below which it may be cleared for the various industries, without detriment to the general welfare of all concerned.

In deciding upon the location of the lines of a permanent forest reserve it is necessary to consider future as well as present needs. A number of considerations have thus to be taken into account, among which are the benefits to be derived and the uses to which the land would be put if cleared. The former have already been discussed. Of the latter, in the Hilo district there are practically only two; the further extension of the cane fields and the opening of tracts for settlement.

At present, with the exception of what is raised on the homestead clearings, cane is the only crop grown systematically at the higher elevations. The upper line of the cane fields varies with each plantation. At the western end of the district, owing to the steeper grade, the cane runs up to about 1800 feet. On the plantations in the center of the district the highest cane ranges from 1300 to 1600 feet. While back of Hilo on the more gently sloping lands of Kaumana and Piihonua it runs up to 1800 and 2000 feet. The following table compiled from aneroid measurements, checked in part by known elevations, gives approximately the highest points on each plantation in the district. These points are, as well, the lower edge of the existing forest.

Evaluations of the Highest Cane Fields, Hilo District, Hawaii.

Plantation Name	Approximate Elevation Feet
Laupahoehoe	1800
Hakalau	1500
Honomu	1400
Pepeekeo	1600
Onomea	1500

Hilo Sugar Co.	
Fee lands	1500
Homestead lands	1800
Hawaiian Mill Company	2000 [page 279]

The elevation at which the highest cane now stands practically marks in each case the limit of profitable cultivation under present prices and conditions. Some of the managers expressed the opinion that with a higher price for sugar it would pay to go farther up, while others felt that the full limit had, for them, already been reached. Most of the managers, however, wanted a strip left above their present fields, on their fee lands, so that if later it were found advisable to extend the cane further *mauka*, there would be room to do so. Seventeen hundred and fifty feet was considered by all of them as being sufficiently high, and this elevation was agreed to by practically all as the best line for the permanent forest boundary.

The other main factor in the case is the demand for land for settlement and homestead purposes which will inevitably follow the development of the Island of Hawaii, through the building of the projected Kohala-Hilo Railroad and the improvement of Hilo harbor—both of which must eventually come. Indeed, because of its location and natural advantages, there are already applicants for all the land now available in the Hilo district.

As a basis on which to work in determining the location of the line, the report to Ex-Governor Dole, made by Mr. George Ross, consulting forester for the North Hilo district, was used. In this report, which embodied the consensus [sic] of opinion of the managers of the various plantations in the district, it is recommended that the lower boundary of the reserve be drawn approximately on the seventeen hundred and fifty foot contour line. In this recommendation I am ready, on the whole, to concur, because I believe that a line so drawn would sufficiently protect the forest and safeguard the water supply of the district, while at the same time making available all the land which can reasonably be expected will be utilized within a considerable period of years.

Reserve Line Recommended.

In the absence of a good topographic map, it is difficult to discuss the location of this line except in a general way. For this reason the seventeen hundred and fifty foot contour has been adopted, although the line as actually laid out will vary more or less from it. At either end of the district, owing to the fact that the land has already been cleared, or partitioned off into homestead tracts, it will be necessary to go somewhat higher. When the time comes for running the line out on the ground it [page 280] should be drawn between prominent points—such as hills, junctions of ridges or ravines, pronounced angles in streams, etc.—and such points should be permanently marked.

Based upon the topographic data now in hand, I therefore recommend as the lower boundary of the proposed forest reserve in the Hilo district, the following line. *Starting at the Laupahoehoe homestead tract, and following the upper boundary of the same to its eastern mauka corner, thence across to, and along the upper boundary of the Maulua homestead tract, thence to the top of the Kamaee tract, thence across the lands of Hakalau and Kaiwiki to the upper line of the proposed Honomu homestead tracts, as recommended in my report upon that land; thence through the mauka corners of the lands of Kawainui and Puumoi to the upper corner of the land of Kikala, on the boundary of the Kaiwiki homesteads; thence from the eastern boundary of this tract, at about the same elevation, the line should cross to the Awehi stream, above the cane fields of the Hilo Sugar Company; and thence across the land of Piihonua, around the top of the existing cane, to the 1881 lava flow.*

Such a line would, I believe, meet the requirements of future growth and be above practically all the land best suited for agriculture.

Above seventeen hundred feet the land rises more steeply than at lower elevations and the soil is thinner. This fact combined with the greater rainfall and the consequently greater erosion makes these upper lands less desirable for agriculture. Furthermore, as many of the gulches split up at this elevation into ravines and gullies, the fields in themselves are smaller and less easily managed.

It is an axiom on Hawaii that success in the matter of homesteads is very largely a question of transportation. In a wet district like Hilo it is next to impossible to get the crop grown on the land to market without roads—unless like cane, it can be flumed. This is not the place to discuss the road question, nor whether homestead roads should be built by the government or by the settlers themselves. It is enough to say that even under the most favorable conditions, it will be a long time before there will be money enough to build roads to the higher elevations in the Hilo district, or before such roads can be considered as a paying investment. [page 281]

The foregoing observations apply, of course, only to the Government lands, but on the privately owned lands the line chosen has the advantage of allowing the plantations the leeway which many of them desire for possible future growth.

It is not the intention of this report to convey the idea that the land up to the proposed line should at once be cleared. On the contrary, the forest because of its beneficial influence, should be allowed to remain intact as long as possible, but if the time does come when the land is more needed for other purposes than for forest, it is believed that the forest below the line may then be cleared without detriment to the best interests of all concerned.

If these recommendations be approved by the Board I recommend that the Governor be requested to set aside, as soon as practicable, all the government lands lying above the proposed line and extending up to an upper line, the location of which is to be determined in the near future.

I further recommend that the owners of private lands within this reserve be encouraged to turn them over to the Government under the terms of Act 44...

Ralph S. Hosmer,
Superintendent of Forestry.

Hilo Forest Reserve.

The following resolution was adopted by the Commissioners of the Board of Agriculture and Forestry:

Resolved, That the Board of Agriculture and Forestry approves and recommends that all government and other lands in the district of Hilo, Island of Hawaii, lying above a line approximately 1750 feet above the sea, be set apart as a forestry reservation, subject to such change in detail of said location as is recommended by the Superintendent of Forestry in his report upon this subject, dated August 9, 1904, and on file in the records of the Board;

Resolved, That the Superintendent of Forestry be and he hereby is instructed and directed to secure as speedily as practicable a detailed description and map of the said

boundary line of said forest reservation; in order that the same may be referred to the Governor for his approval in accordance with the terms of Section 6 or Act 44 of the Session Laws of 1903... [HFA, 1904:282]

In October 1904, R. Hosmer, Superintendent of Forestry reported back to the Commissioners on the recommendations for the upper boundary of the Hilo Forest Reserve. As a part of the research, field visits through Humu'ula, Pi'ihonua and other affected lands, and interviews with individuals knowledgeable about the landscape were conducted. Hosmers' report described the main plants of the forest, and lay of the land:

October 14th, 1904.
Committee on Forestry

...I have the honor to submit herewith a report, with recommendations, on the upper boundary of the proposed forest reserve in the Hilo District, Island of Hawaii.

During the last week of August I made a careful examination of the upper edge of the forest from the 1881 lava flow to the Hamakua boundary, going over the ground in person and supplementing the information so gained by interviews with various persons familiar with the locality, and the conditions existing therein.

In this connection I would acknowledge my obligation to the managers of the several plantations in the Hilo District, to Mr. A.B. Loebenstein of Hilo, and especially to Mr. W.H. Shipman, for information in regard to this question and for other assistance given me.

The general reasons which underlie the establishment of the Hilo Forest Reserve have already been discussed in my report on the lower boundary. In brief they are, that this reserve is needed to protect the watersheds of the streams throughout the district, on which the plantations, and to some extent the other industries, present and prospective, along the coast, depend for their most satisfactory development. This protection can be best afforded by the setting apart of the belt of forest along the slope of Mauna Kea, which receives the heavy rainfall, and in which the streams head. The object of the reserve is to prevent [page 313] excessive run-off, equalize the flow in the streams and protect the slopes against erosion.

It was pointed out in my former report that the trade winds bring in a bank of moisture-laden clouds, which pile up against the side of Mauna Kea between the elevations of approximately 2000 and 6000 feet. From the evidence available it appears that the precipitation is heaviest between the elevations of 3000 and 4500 feet, and that from the latter point up to an elevation of about 6500 feet there are only light rains and scattering showers. Higher than this on the slope and in the saddle between Mauna Loa and Mauna Kea, the trade winds die out, much as they do in Kau, just beyond the Volcano House. The point is somewhere between Puu Oo and Kalaieha—the latter place seldom having rain from trade wind clouds, while conversely, during the times of Kona winds, the rains that fall at Kalaieha do not reach Puu Oo.

On the main slope of Mauna Kea, above approximately the 6500 foot level, the rains are said to come principally with northerly winds. The storms are usually short ones, but precipitation is very heavy while it lasts, rapidly filling the ordinarily dry stream beds so that the fords become impassable. When the rain is over, however, the streams fall just as quickly, the water rushing down the mountain and swelling the volume of the permanent streams below. When more rainfall and stream-flow records come to be kept it will be interesting to see how much and for how long the lower parts of the streams are influenced by these sudden downpours far up on the mountain.

Under existing conditions little can be done to regulate the flow of the torrents resulting from the storms just described. The open *Mamane* (*Sophora chrysophylla*) forest now growing on the steep, upper slopes, has no appreciable effect on the run-off, while the establishment of a cover of vegetation sufficiently dense to make any material difference in the discharge of the streams is practically out of the question. The chief interest in water conservation thus centers in the lower forest.

The upper line of permanent running water in the streams seems to be near the upper edge of the belt of heavy precipitation, although the dense forest above must exercise a considerable influence in absorbing the light rains and helping to feed the springs from which the upper brooks come.

The dense forest now extends up to an elevation of a little [page 314] over 6000 feet. *Koa* (*Acacia koa*) and *Ohia Lehua* (*Metrosideros polymorpha*) are the predominating trees. With them are associated *Koolea* [sic] (*Myrsine lessertiana*), *Pilo* (*Coprosma cymosa*), *Olapa* (*Cheirodendron gaudichaudii*), *Naio* (*Myoporum sandwicense*), and some other trees of minor importance, and the dense mass of ferns, bracken, and other undergrowth characteristic of the Hawaiian forest.

Between the upper edge of the dense forest and the boundary of the land of Humuula there is, on the lands from Piihonua to Honohina, a strip of land on which the forest has been wholly or in part destroyed, through fire, grazing, and insect injuries. While most of this damage has occurred in recent years, it is probable that the dense forest never extended much above the boundary of Humuula. At this point the *Koa* and *Ohia* are replaced by *Mamane*, which, forming an open stand, extends practically to the upper boundary of Humuula, and all along the slope of Mauna Kea.

Beyond Honohina the dense forest of *Ohia* and *Koa* comes up to the Humuula line. From here on to the Hamakua boundary, the proportion of *Koa* is larger and the forest is of greater potential commercial value.

The lands within the limits of the proposed Hilo Forest Reserve, which extend through the forest, are from south to north as follows: Piihonua, Paukaa, Papaikou, Makahanaloa, Hakalau, Honohina, Piha, Maulua, *Laupahoehoe*, Waipunalei, and a part of Humuula. Of these lands Piihonua, Piha, Humuula and *Laupahoehoe* are owned by the Government and are, with the exception of the last named, under lease for various terms.

A portion of Laupahoehoe is under lease also, but a large part of the land bearing this name on the official maps is included in the tract known as Papaaloe Forest, which is still in the hands of the Government. The remaining lands in the list are owned in fee by plantations or individuals.

The upper part of Piihonua is sublet to Mr. W.H. Shipman, the boundary being a line run across the land from the center of Reed's Island, in the 1855 lava flow. Mr. Shipman has just completed a fence across Piihonua somewhat over a mile *mauka** [page 315] of his lower boundary. Hereafter all of his cattle will be kept above this line. The fence starts on the rough *aa* of the 1855 flow above Halealoha, runs north to the trail, then eastward to the opening in the woods about north of Halealoha, and thence in a fairly straight line across Piihonua to a point on the Paukaa boundary, two miles from the Humuula line. There are one or two jogs in the fence line which may later be eliminated, but this straightening would not materially alter the direction of the line.

* The convenient Hawaiian terms *mauka*, signifying "inland," hence "toward the mountain," and *makai*, "toward the sea," represent the two leading directions throughout the Territory, and are in general use among all classes.

Through an arrangement with Brewer & Co., Mr. Shipman has continued the fence across the lands of Paukaa, Papaikou and Makahanaloa, at a slightly higher elevation than that across Piihonua. The fence corners on these lands are one and one-half, instead of two miles *makai* of the Humuula boundary. The average elevation of the fence across these lands is little over 6000 feet. Its location is practically at the upper edge of the dense forest.

Below the line of the fence is a considerable band of wild cattle, which has been estimated to consist of over 500 head. Formerly these cattle ranged all the way from Laupahoehoe to the 1855 flow, but constant hunting at the northern end of the district has now driven the greater part towards Piihonua. By the terms of his agreement with Brewer & Co., Mr. Shipman leases the land, builds and keeps in repair the fence, and agrees to exterminate the wild cattle in the forest below. This work is now going on with systematic driving and shooting, which will be continued as long as there are any wild cattle left.

If a similar arrangement could be made with Irwin and Company, Mr. Shipman would be glad to continue the fence across the lands of Hakalau and Honohina.

There exist division fences between Humuula and the lower lying lands as far north as Hakalau. Beyond this the lands are unfenced and are open to cattle or sheep from above. As a matter of fact the sheep are not allowed to get far into the forest, because of the difficulty in herding them in the underbrush. Wild pigs abound in the forest. No estimate can be made of their number.

The fence erected by Mr. Shipman meets so many of the requirements of the upper boundary of the proposed Hilo Forest Reserve, that it seems to me wise to adopt it, from the 1855 flow to the land of Hakalau, and the line desired. From there on I recommend that the boundary follow the edge of the forest across Hakalau and Honohina. (This coincides with the location de- [page 316] sired by Mr. Shipman for the extension of his fence.) From the corner of Honohina, Piha and Humuula, the reserve line should follow the lower boundary of Humuula, as far as the north *mauka* corner of Waipunalei, thence across Humuula to a point on the Hilo-Hamakua boundary, to be determined later in connection with the Hamakua reserve.

My reasons for recommending this line are as follows: A belt of at least two miles of forest above the upper limit of the heavy rain belt and the head of the permanently running streams is thus reserved.

The line is far enough *mauka* to include practically all of the area subject to the showers and light rains occurring above the belt of heavy precipitation.

The reservation as recommended will, I believe, insure the objects for which it is made. While the forest could undoubtedly be extended further *mauka*, I think the land above the proposed line can be used for other purposes than forest, without detriment to the best interests of the reserve.

By adopting the line recommended, the question of fencing a considerable portion of the boundary is obviated. As the objects of the plantations in their agreement with Mr. Shipman are identical with those of the reserve, in so far as they relate to fencing and to the extermination of wild cattle, they can well be taken advantage of, by co-operating with the parties to the agreement.

There remains one more point to be considered; the southern boundary of the reserve. This seems to be naturally fixed by the lava flows of 1855 and 1881, beyond which to the

south and east, the whole character of the country changes. But it is urged by some that there is agricultural land on Piihonua between the 1855 flow and the Wailuku river, which under certain conditions, could be opened to settlement without detriment to the reserve. This is a question for future study. At present the section is unexplored. *No trails penetrate the forest and its outer edge only is accessible.*

Should the projected road from Hilo, known as the "One County Road," be built, the area in question would be brought into touch with markets. If it were then found that land suitable for agriculture existed, and that it could be opened for settlement without endangering the sources of the Wailuku, I should be in favor of so doing. But until there is a more definite prospect [page 317] of the road being built, I believe the land is better in a forest reserve. I therefore recommend that the southern boundary of the Hilo Forest Reserve be the lava flow of 1855.

If the recommendations in this report are approved by the Board, I suggest that the Governor be requested to set aside, as soon as practicable, all the Government land not now under lease within the limits of the Hilo Forest Reserve. I further suggest that the Board make known its willingness to consider propositions looking to the turning over to the Government, under the terms of Act 44 of the Session of 1903, of privately owned lands within this reserve... [HFA, 1904:313-318]

The Board of Commissioners subsequently met, to further discuss the boundaries and elevational range of the forest lands being considered as a part of the Hilo Forest Reserve. A.B. Loebenstein was authorized to survey the boundaries of the reserve. The Board focused on the upper boundary of the reserve, with discussion as to whether or not Humu'ula—lands leased as a part of the Sheep Station Company—should be included in the reserve. Excerpts from the minutes of the meeting on November 23rd, 1904, provide the following documentation:

November 23, 1904

Discussion on the Upper Boundary of the Hilo Forest Reserve:

...Mr. Brown moved that Mr. Loebenstein place the lower line of the proposed Hilo Forest Reserve on the map, and furnish as close a description of such line as can, at the present time, be given. Motion seconded by Mr. Carter and carried... ...Mr. Hosmer said that there was one more point to be considered in regard to the Hilo Forest Reserve; that of getting a description made of the upper line. He said that Mr. Loebenstein had been requested to make a map and prepare a description of this line, and that he now has the matter under consideration. This map would be much smaller than that of the lower boundary.

Mr. Loebenstein suggested that the Kalaieha section be included in the map. He said that this could be put in from data now on file in his office and that it would be as well to include it.

Mr. Thurston asked if Kalaieha was included in the reserve, to which the Superintendent of Forestry replied that the reserve does not touch Kalaieha. The upper line (pointing to the map) and Kalaieha are several miles apart.

Mr. Thurston asked if Piihonua runs over as far as Kalaieha, to which Mr. Brown replied that it does, adjoining the land of Waiakea.

Mr. Loebenstein stated that Waiakea was on the Mauna Loa side.

Mr. Loebenstein said that he would like to give the Board a map which would be complete in every detail.

Mr. Thurston asked the name of the forest that is below and near Kalaieha, to which Mr. Hosmer replied that it is the upper extension of the Waiakea forest.

Mr. Loebenstein stated that he did not know just how far up the forest extended, but would like to have the map show some of the Mauna Kea slope. He suggested an elevation of about 8000 feet, as the vegetation extends up to about that point.

Mr. Hosmer said that this line would take in practically all of the existing in forest, as the *Mamani* does not go much above the upper Humuula boundary. The upper Humuula boundary above Papaikou and Hakalau (pointing to the Government map) is about 9500 feet. The contour lines are approximately correct.

Mr. Hosmer said that there is a section above the present *Mamani* forest which he thought might profitably be planted with spruces and pines, between the elevations of 8000 and 10,000 feet. This area is practically all on the land of Kaohe. Most of the land hereabout is good grazing land.

Mr. Hosmer said that he thought that the only government land which is not now under lease within the limits of the proposed reserve, is the upper section of Laupahoehoe. The names are somewhat uncertain but on the list of leases which Mr. Pratt has made up this section is known as Papaaloo Forest. This is the only land which the Board can ask the Governor to set aside. Asked if he was referring to the lower line, replied to both lines. Mr. Thurston said that the Governor could set aside other than government lands by the consent of the owners.

Mr. Hosmer said that the upper line was concerned in the Papaaloo Forest.

Mr. Loebenstein was asked when he could furnish a map and description of the upper line, to which he replied that he could not have it ready before the beginning of January.

Mr. Hosmer asked Mr. Loebenstein if he could furnish a general description of the upper line, to be followed later by an exact description, to which Mr. Loebenstein replied that a general description could be given.

Mr. Thurston stated that the two propositions could be acted upon entirely independently, one of the other.

Mr. Carter asked how reserves were going to be set apart, before the boundary lines were determined upon.

Mr. Brown also said that the reserves could not be set aside until an upper line is made. Then all the land located within the reserve can be set apart.

Mr. Loebenstein said that there are very few government lands remaining unleased.

Mr. Giffard said that private owners could not make any propositions until the boundaries are fixed he also said he did not think this matter could be placed before the Governor until both of the boundaries could be given him.

Mr. Carter said that the Board could not deal with private owners until a line had been fixed.

Mr. Hosmer said that the boundary on the north side is the Hamakua District line and on the south side the 1855 lava flow.

Mr. Brown asked if it was the intention of the Board to make the land of Humuula a forest reserve, to which Mr. Hosmer replied in the negative.

Mr. Holloway asked what the objections were of following the lower line of Humuula to which Mr. Hosmer replied that there is a strip of land here which could be used for grazing without detriment to the forest below. There is a sufficient extent of forest reserve below to safe guard all the streams. The upper land is good for grazing. Further north the dense forest comes up much closer to the Humuula line, and there is also a great deal of *Koa* timber which the Government should reserve, and later utilize.

Mr. Thurston stated that it seemed that the Board was not in a position to make recommendation to the Governor until the upper line was fixed, and shown on the map. He asked Mr. Loebenstein how long it would take to make such a map and prepare a description.

Mr. Loebenstein replied that he would prefer to return to Hilo and prepare a map and description in his own office. By so doing he could furnish information that would stand any reasonable test. He thought that he could give this to the Board about the end of the year.

The president then called for any other forestry matters which were to be presented...
[HSA, Com 2-8, Minutes]

Proclamation of the Hilo Forest Reserve (1905)

On July 24th, 1905, Acting Governor A.L. Atkinson issued the proclamation establishing the Hilo Forest Reserve. The description of the lands and notes of survey are given below:

The Hilo Forest Reserve

It is with a feeling of no small satisfaction that we are able this month to chronicle the creation of the Hilo Forest Reserve on the Island of Hawaii.

Based upon reports and recommendations made by the Superintendent of Forestry and approved by the Committee on Forestry,* the Board of Commissioners of Agriculture and Forestry, at a meeting held on June 30, 1905, unanimously adopted the following resolution:

“RESOLVED, that the Forest Reserve in the Hilo District, lying between the 1881 Lava Flow, back of Hilo Town, and the Hamakua District line, in the Hilo District, Island of Hawaii, as recommended by the Committee on Forestry, based upon the reports of the Superintendent of Forestry, dated August 9th, 1904, October 14th, 1904, and June 28th, 1905, and on maps and a description of the boundary prepared by Mr. A.B. Loebenstein and by the Survey Office, now on file in the office of this Board, a copy of which description is hereto attached and forms a part of this resolution, be approved.

RESOLVED, that the Board recommends to the Governor that the Government lands within the boundaries of the Proposed Forest Reserve, be set apart by him after the hearing required by Law. [page 181]

* These reports appeared in the October and November (1904) issues of the Forester, Vol. 1, pp. 275 to 282 and 313 to 318.

RESOLVED FURTHER, that the Board recommends to the Governor, that all the land within the said described boundaries be set apart as a Forest Reserve, subject to all private rights and titles, and that all owners of private lands lying within said boundaries be requested to co-operate with the Board of Agriculture and Forestry in reserving all of said lands for forestry purposes, in accordance with the terms of Chapter 28 of the Revised Laws of Hawaii.

On July 19, Acting Governor Atkinson and the Board of Commissioners of Agriculture and Forestry held the Public Hearing required by Law. No opposition to the Reserve developing, Acting Governor Atkinson declared the Hilo Forest Reserve to be created, and on July 24th, signed the formal proclamation, describing the boundaries and setting apart the unleased Government lands lying within them. *The total area of the Reserve is 110,000 acres, more or less; the Government lands actually set apart 12,771 acres, more or less.* The proclamation issued by Acting Governor Atkinson will appear in the August issue of the Forester.

It may perhaps be well to explain the relation of the lands set apart to the remainder of the area embraced within the limits of the Reserve. By officially recognizing the larger area the Governor and the Board of Agriculture and Forestry go on record as to the section which they believe it is to the advantage of the Territory to devote to forest purposes. The Government then shows its good faith by setting apart the unleased Government lands lying within the limits of the Reserve and requests private owners to follow its example and co-operate under the Law to carry out the plan and secure the objects for which the Reserve is made.

In the case of the Hilo Forest Reserve, from one-third to one-half of the land within the boundaries is owned by private individuals or corporations. The remainder is Government land, for the most part lease. *The Government sets aside at this time the two Government lands not now under lease, viz: the mauka portion of Honomu, 926 acres, more or less, and the section above Laupahoehoe, known as the Papaaloe Forest, 11,845 acres, more or less.* As the leases on other Government lands run out the Board of Agriculture and Forestry will recommend that the portions within the Reserve be also set apart. [page 182]

Except as the owners of private land or the lessees of Government land co-operate with the Board of Agriculture and Forestry as provided by Law, the Government can exercise no authority over the other lands within the Reserve boundary.

But, as the Reserve is established primarily to maintain favorable conditions of watershed protection on which the plantations and the other large owners so much depend, it is clearly in the interest of these corporations to co-operate with the Government by setting apart the lands belonging to them until all of the area within the boundaries of the Reserve is devoted to the purposes of forestry.

As an example of the interest of the private owners within its boundaries in the creation of the Hilo Forest Reserve, the action of the Bishop Estate is significant. At the Public Hearing Mr. F.S. Dodge, Superintendent of the Bishop Estate, stated that the Estate was heartily in favor of the Reserve and proposed to co-operate with the Government in making it effective. The Estate has for some years maintained certain of its lands in the Hilo District as Forest Reserve, both within and extending *makai* of the boundaries adopted. It is expected that other large interests will follow the lead of the Bishop Estate. [page 183]

***By Authority
Proclamation of Forest Reserve, Hilo District, Island of Hawaii.***

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of the Territory of Hawaii, enacted April 25, 1903, and amended by Act 65 of the Session Laws of the Legislature of 1905, and of every other power me hereunto enabling, I, A.L. C. ATKINSON, Acting Governor of the Territory of Hawaii, having duly given the notice and held the hearing as in said Acts provided, do hereby approve as a Forest Reserve the lands lying between the 1881 Lava Flow back of Hilo Town and the Hilo-Hamakua District line, and between a line drawn approximately parallel to the coast (having an elevation of about 1750 ft. at the South end and an elevation of about 2000 ft. at the North end) and a line approximately along the top of the woods, in the District of Hilo, Island of Hawaii, Territory of Hawaii, more particularly described as follows, viz:

Lower Line.

“Beginning at a point on the extreme lower end of the *Laumaia* Branch of the Lava Flow of 1881, this point being on the boundary line between the lands of Punahoa 1st and 2nd. Its co-ordinates referred to the Halai Survey Reference Station, being 8669 feet South, 24,934 feet West, the boundary runs by the true meridian:

1. *N. one degree 41 minutes E. 4555 ft. crossing the various subdivisions of the land of Punahoa and to a point on the boundary line of Punahoa and with the land of Piihonua (Government), the co-ordinates of the said point referred to the Halai Survey Reference Station, being 4432 ft. South, 24,809 ft. West; thence crossing the land of Piihonua;*
2. *N. 21 degrees 32 minutes E. 4247 ft. to junction of the Hookelekele Stream with a branch from the North, the co-ordinates referred to the Halai Survey Reference Station, being 480 ft. South, 23,250 ft. W.; thence following up the middle of said branch which forms the present South boundary of the Hawaii Mill Company's Plantation to the South-west angle of the same, the direct bearing and distance to said point being;*
3. *N. 62 degrees 9 minutes W. 6165 ft., the co-ordinates referred to the Halai Survey Reference Station, being 2400 ft. North, 28,700 ft. West, thence across the lands of Piihonua and Waiau (Government);*
4. *N. 27 degrees 47 minutes E. 8538 ft. to a point in the Awehi Stream, the co-ordinates referred to the Halai Survey Reference Station, being 9950 ft. North, 24,720 ft. West, thence down the middle of the Awehi, also called the Waiau Stream, to the junction of same with the Alae Stream, the direct bearing and distance being;*
5. *S. 59 degrees 08 minutes E. 5964 ft., the co-ordinates referred to the Halai Survey Reference Station, being 6890 ft. North, 19,600 ft. West, thence across the lands of Pueo [Pueo] (Hilo Sugar Co.), Kalalau and Alae (Estate B. Pauahi Bishop). [page 245]*
6. *N. 4 degrees 36 minutes E. 6545 ft. to the Southwest angle of Kawaiki Homestead, Lot No. 40, at the junction of the Maili and Pahoa Streams, the co-ordinates referred to the Halai Survey Reference Station, being 13,405 ft. North, 19,075 ft. West, thence following up the middle of the Maili Stream and gully forming the South boundary of the Kaiwiki Homestead Tract, the direct bearing and distance being;*

7. N. 81 degrees 10 minutes W. 18,130 ft. to the Southwest angle of Kaiwiki Homestead, Lot No. 73, the co-ordinates referred to the Halai Survey Reference Station, being 16,189 ft. West, thence along West boundary of Kaiwiki Homestead, Lot No. 73;
8. N. 5 degrees 58 minutes W. 2168 ft. to Northwest angle of Kaiwiki Homestead, lot No. 73, at a point on the South *Pali* of the Honolii Stream called Waikēe the co-ordinates referred to the Halai Survey Reference Station, being 18,345 ft. North, 37,226 ft. West, thence along North line of Kaiwiki Homestead Tract to the Northeast angle of Kaiwiki Homestead Lot No. 51, the direct bearing and distance being;
9. S. 34 degrees 10 minutes E 15,166 ft. to said Northeast angle the co-ordinates being referred to the Halai Survey Reference Station being 16,768 ft. North, 22,125 ft. West, thence across the land of Kikala (Estate B.P. Bishop);
10. N. 18 degrees 58 minutes E. 986 ft. to junction of the Honolii and the Pohakupaa Streams, thence across the land of Paukaa (Onomea Sugar Company);
11. N. 1 degree 10 minutes 30 seconds 3145 ft. to a point on the boundary line between Paukaa and Pahoehoe (Estate B.P. Bishop), thence across the land of *Pahoehoe*;
12. N. 1 degree 10 minutes 30 seconds 3605 ft. to a point in the middle of the Pahoehoe stream the co-ordinates referred to the Halai Survey Reference Station being 24,460 ft. North, 21,671 ft. West, thence to and across the land of Papaikou (Onomea Sugar Co).
13. N. 2 degrees 29 minutes E. 6615 ft. to a point in the Alakahi Stream marking the West angle of the land of Puumoi (Onomea Sugar Co), this point being distant 1964 ft., bearing South 86 degrees 43 minutes E (True) from an x cut in the rock at the Waiemi Falls, the co-ordinates referred to the Kauku Survey Reference Station being 11,271 ft. North, 1080 ft. West, thence across the lands of Alakahi, Mokuoneki and Kahalii (Onomea Sugar Co.);
14. North 4491 ft. to a point on the boundary of Kahalii and Onomea (Onomea Sugar Co.) the co-ordinates referred to the Kauku Survey Reference Station being 6780 ft. South, 1085 ft. West, thence across the land of Onomea;
15. N. 14 degrees 23 minutes W. 3251 ft. to head of the land of Kawainui (Government) the co-ordinates referred to the Kauku Survey Reference Station, 3632 ft. South, 1893 ft. West, thence across the land of Makahanaloa (Pepeekeo Sugar Co.) to and along the upper limits of the Honomu Homestead Lots as shown on Government Survey Registered Map No. 2296 to the South *Pali* of Kolekole Stream and up said *Pali* to a point, the co-ordinates of which referred to the Kauku Trig. Station [page 246] are 5250 ft. North and 5000 ft. West, the direct bearing and distance between the initial and final points, being N. 19 degrees 17 minutes W. 9409 ft, thence across the lands of Kaiwiki and Hakalauiki (Government), Hakalaunui (Hakalau Sugar Co.) Kamaee (Government), Umauma (Estate B.P. Bishop), Opea (Government), Honohina (Liliuokalani) and Nanue (Hakalau Sugar Co.);
16. N. 22 degrees 14 minutes W. 22,361 ft. to the South angle of the Kahuku Homestead Lot No. 16 the co-ordinates referred to the Puuohai Survey Reference Station being 13,710 ft. South, 1884 ft. West, thence across the land of Piha (Government);

17. N. 58 degrees 19 minutes W. 1519 ft to a point in the Waikaumalu Stream the co-ordinates referred to the Puuohai Survey Reference Station being 12,912 ft. South, 3177 ft. West, thence up the Waikaumalu Stream which forms the East boundary of the Maulua Gehr Settlement Association Tract to the Southeast angle of Lot No. 67 of said Tract, the direct bearing and distance being;
18. S. 67 degrees 58 minutes W. 10,260 ft. to aforesaid point, the co-ordinates referred to the Puuohai Survey Reference Station being 16,761 ft. South, 12,687 ft. West, thence along top of Gehr Settlement Association Lots No. 67, 68, 69 and 70;
19. N. 34 degrees 55 minutes W. 2233 ft to Southwest angle of Lot No. 70 the co-ordinates referred to the Puuohai Survey Reference Station being 14,931 ft. South, 13,965 ft. West, thence along the boundary of Mauluanui (Mrs. Robertson);
20. N. 37 degrees 37 minutes E. 5852 ft. to a natural divide or fork in the Pohakupuka Stream called Kepaniwai the co-ordinates referred to the Puuohai Survey Reference Station being 10,306 ft. South, 10,403 ft. West, thence along the boundary of Maulua and Gehr Settlement Association Lots;
21. N. 2 degrees 20 minutes W. 3062 ft. to a point in the Makaliiloa Stream 150 ft. above the Hauwanawana Falls, the co-ordinates referred to the Puuohai Survey Reference Station being 6347 ft. South, 10,564 ft. West, thence across Maulua;
22. *N. 29 degrees 14 minutes W. 4632 ft. to a point on boundary of Mauluanui and Weloka (Government), this point being distant 700 ft. and bearing South 39 degrees 16 minutes West (True) from an Ohia tree marked L at edge of old water ditch, the co-ordinates referred to the Puuohai Survey Reference Station being 2306 ft. South, 12,826 ft. West, thence across the lands of Weloka, Keaalau, and Kapehu (Government);*
23. N. 64 degrees 35 minutes W. 3371 ft. to Southeast angle of *Laupahoehoe* Homestead, Lot No. 39, the co-ordinates referred to the Papalooa [Pāpa'aloa] Survey Reference Station being 10,155 ft. South, 2480 ft. West, thence along South line of *Laupahoehoe* Homestead Tract; [page 247]
24. *N. 61 degrees 25 minutes W. 11,631 ft. to Southwest angle of Laupahoehoe Homestead, Lot No. 7, the co-ordinates referred to the Papalooa Survey Reference Station being 4413 ft. South, 13,019 ft. West, thence across the lands of Puualaea, Kiilau and Laupahoehoe 1st and 2nd (Government);*
25. N. 58 degrees 00 minutes W. 5097 ft. to a point on the boundary of Waipunalei (S. Parker), the co-ordinates referred to the Papalooa Survey Reference Station, being 1712 ft. South, 17,335 ft. West, thence across the land of Waipunalei;
26. N. 86 degrees 16 minutes W. 1997 ft. to the Southeast angle of Section 13 Kahooahuna, the co-ordinates referred to the Papalooa Survey Reference Station being 1582 ft. South, 19,331 ft. West, thence across top of Section 13 Kahooahuna to point in middle of Mauiana gulch on boundary of Humuula;
27. N. 46 degrees 24 minutes W. 1786 ft. to the Southwest angle of Section 13, thence down middle of the Mauiana gulch and boundary of Humuula (Government);
28. N. 27 degrees 25 minutes E. 2986 ft. to a point in the Mauiana gulch, the co-ordinates referred to the Humuula Survey Reference Station, being 8777 ft. South, 2470 ft. West, thence across the lands of Humuula and Ookala;

29. N. 61 degrees 35 minutes W. 4661 ft. to a pool at foot of Falls in the Kaula gulch called Paeoapu, said point forming the Southwest angle of the land of Ookala and on the boundary between the Hilo and the Hamakua Districts, the co-ordinates referred to the Humuula Survey Reference Station being 6559 ft. South, 6507 ft. West, thence up along said boundary between the Hilo and Hamakua Districts to an X cut in the rock ledge near the middle of the Kaula gulch at the old Keanakolu-Waimea trail crossing, the said gulch at this point being the boundary of the Hilo and Hamakua Districts, the co-ordinates of the said point being North 13,204.9 ft., East 3,301.4 ft., referred to the "Puukalepa" Terr. Survey Station.

Upper Line.

30. Beginning again at the initial point the boundary runs in a general westerly direction up and along the northern edge of the various lava flows to the point described in Bd. Cert. No. 53, Piihonua, as Mawae, the mark being a large monument of stones erected on the top of bank of the main *Aa* lava channel of the 1855 Lava Flow, situated a little above the bend of the trail over the lava, where it leaves the *Pahoehoe* crossing the *Aa* channel, and about 700 ft. South of the entrance of the trail into the Halealoha opening the co-ordinates being South 40,908 ft., East 6350.0 ft. referred to the "Aahuwela" Survey Reference Station, thence by true azimuths;
31. 195 degrees 42 minutes 40,366 across the land of Piihonua (Territory of Hawaii) to a point on the South boundary line of Paukaa (Onomea Sugar Co.), the co-ordinates being South 2040 ft., East 17,273.2 ft. referred to the "Aahuwela" Survey Reference Station; [page 248]
32. 215 degrees 55 minutes 30 seconds 3436.7 ft. across the land of Paukaa, to a point of the South boundary of Papaikou (Onomea Sugar Co.), the co-ordinates being North 742.2 ft., East 19,289.7 ft. referred to the "Aahuwela" Terr. Survey Station;
33. 178 degrees 03 minutes 43 seconds 4791.0 ft. across the land of Papaikou to a point on the South boundary of Makahanaloa (Onomea Sugar Co), the co-ordinates being North 5983.3 ft., East, 19,135.0 ft. referred to the "Aahuwela" Terr. Survey Station;
34. 168 degrees 01 minutes 55 seconds 4783 ft. across the land of Makahanaloa to a point on the South boundary of Hakalaunui (Hakalau Sugar Co.), the co-ordinates being 250.7 ft. South, 7278.2 ft. East referred to the "Kaloaloha" Terr. Survey Station;
35. 179 degrees 26 minutes 56 seconds 9294.0 ft. across the land of Hakalau to a point on the South boundary of Honohina (Liliuokalani), the co-ordinates being North 9032.3 ft., East 7188.8 ft. referred to the "Kaloaloha" Terr. Survey Station;
36. 114 degrees 09 minutes 02 second 8695.7 ft. across the land of Honohina to Northwest angle of same, a *Koa* tree blazed H (old mark) re-marked
L
standing on the north bank of the Nahui [Nauhi] gully, about 50 ft. East or *makai* of the Hopuwai-Keanakolu trail where it leaves the gully, the co-ordinates being North 12,590.4 ft., West 745.5 ft., referred to the "Kaloaloha" Terr. Survey Station;

37. 183 degrees 19 minutes 4580 ft. along West or *mauka* line of Piha (Territory of Hawaii) bordering Humuula (Territory of Hawaii) to Northwest angle of Piha, at a point on the Hopuwai-Keanakolu trail where it leaves the brush and enters an open flat covered with black sand, in the middle of which has been erected a large mound of stones, called Kahuwai, the co-ordinates of the aforesaid Northwest angle of Piha being South 7867.3 ft., East 10,415.5 ft. referred to the "Puukalepa" Terr. Survey Station;
38. 109 degrees 23 minutes 6208 ft. along West or *mauka* line of Mauluanui (Mrs. Sara Robertson) bordering the land of Humuula to Northwest angle of Maulua Nui at a Koa tree
- L
- surrounded by a mound of stones, a little East of the Hopuwai-Keanakolu trail, and at bend of the same into the Kaiiiki gully, the co-ordinates [page 249] being South 1765.3 ft., East 9271.5 ft. referred to the "Puukalepa" Terr. Survey Station;*
39. 172 degrees 02 minutes 12 seconds 4125 ft. along West or *mauka* boundary of Laupahoehoe (Territory of Hawaii) bordering the land of Humuula, to the Northwest angle of Laupahoehoe at the crossing of the Hopuwai-Keanakolu trail, over the "Keahuaai" or "Douglas Pit" gully, the co-ordinates being North 2320.0 ft., East 3700.0 ft. referred to the "Puukalepa" Terr. Survey Station;
40. 229 degrees 55 minutes 4638 ft. along the North boundary of Laupahoehoe bordering Humuula to a mound of stones by a Koa tree marked "Poloka" at West brink or edge of a pool of water called "Kalaukaho" [Kulanihakoi] this forming the Southwest angle of the land of Waipunalei (Samuel Parker), the co-ordinates being North 5306.4 ft., East 12,248.6 ft., referred to the "Puu Kalepa" Terr. Survey Station;
41. 163 degrees 03 minutes 03 seconds 4502.0 ft. along West or *mauka* line of Waipunalei bordering Humuula to Northwest angle of Waipunalei at a point in the middle between three Koa trees marked H, X and W respectively, re-marked.
- L
- distant 1241 ft., bearing 282 degrees 00 minutes from the post set as a Survey Reference Station on the top of the Lahohinu Puu, the co-ordinates being North 9613.4 ft., East 10,936.0 ft. referred to the "Puu Kalepa" Terr. Survey Station;
42. 142 degrees 57 minutes 45 seconds 4374.0 ft. across the land of Humuula to an X cut in the rock ledge near the middle of the Kaula gulch at the old "Keanakolu-Waimea" trail crossing, the said gulch at this point, being the boundary of the Hilo and Hamakua Districts, the co-ordinates of the said point being North 13,204.9 ft., East 3301.4 ft. referred to the "Puu Kalepa" Terr. Survey Station.

Total area 110,000 acres, more or less.

And I do hereby set apart as a Forest Reserve those portions of the Government lands known as the Ahupuaa of Honomu and Papaaloa Forest section (embracing the Government lands between Maulua and Waipunalei), lying within the said metes and bounds... [HFA, 1905:250]

Laupāhoehoe Leasehold Tracts Removed from Lease to Forest Reserve (1910)

In 1910, Governor Frear, removed tracts of land from leasehold interests, to be included in the Hilo Forest Reserve. The proclamation named the lands and described the acreage as:

In the Hilo Forest Reserve I do hereby set apart as integral parts of that Reserve those certain portions of the tracts of government land known as Humuula, 3,901 acres, more or less, Kahoahuna, 46 acres, more or less, Waikaumalo-Maulua, 790 acres, more or less, Opea-Peleau, 230 acres, more or less, Kamaee-Wailua, 930 acres, more or less, Wailea-Kaiwiki, 3,834 acres, more or less, Piha, 3,780 acres, more or less, Piihonua, 33,941 acres, more or less, that lie within the boundaries of the Hilo Forest Reserve, in the District of Hilo, Island and County of Hawaii, Territory of Hawaii, created and approved by proclamation of Acting Governor A.L.C. Atkinson, under the date of July 24, 1905, which said proclamation gives the metes and bounds of said Hilo Forest Reserve, the same being more particularly described by and on a map now on file in the office of the Territorial Survey Department in Honolulu, marked "Registered Map No. 2060," and a description accompanying the same, numbered "C.S.F. 1629," altogether an area of 47,452 acres, more or less... [HFA, 1910:277]

Inspection of the Hilo Forest Reserve Lands (1921)

In 1921, C.S. Judd, Superintendent of Forestry, conducted an inspection of the Hilo and Mauna Kea Forest Reserves. His report on the inspections, published in the Hawaiian Forester and Agriculturalist, documented the importance of the water resources generated by the Hilo forest lands (identifying primary trees found); the extent of the sugar cultivated on lands fed by the stream systems flowing from the forest; the continuing impacts on the forest by wild cattle and ranching interests; and impacts to the forest from plantation and homestead activities. Judd observed:

The Hilo Forest Reserve

Every stream of any moment on the Island of Hawaii, with the exception of those in the Kohala Mountain region, has its source in the Hilo Forest Reserve. Not only does the town of Hilo depend solely upon the water coming from this forest reserve for its domestic uses, but ten sugar plantations absolutely depend upon this water for fluming their crops to the mills, for use in the manufacture of sugar, and for the domestic use of their laborers. The output of these ten sugar plantations, which comprise almost a solid belt of cane fields from 3 to 5 miles wide and 35 miles long, extending from the Olaa Plantation in Olaa to the Kaiwiki Sugar Company at Ookala, and the existence of which the water from the Hilo Forest Reserve makes possible, during the ten years from 1911 to 1920, amounted to 1,126,376 tons of sugar worth approximately \$114,469,455.14.

The Hilo Forest Reserve was the third out of the present total of 47 forest reserves to be set apart and was set aside by a proclamation signed by Acting Governor A.L.C. Atkinson on July 24, 1905. It embraces at present a total area of 110,000 acres, of which 60,223 acres or 55 per cent is unleased land belonging to the Territory, and 49,777 acres or 45 percent is land in private ownership. Owing to the peculiar system of Hawaiian land surveys the private lands and government lands in the reserve are indiscriminately interspersed and usually consist of narrow strips or wedge-shaped pieces of land running from the sea up the slopes of Mauna Kea.

The largest single piece of land in the reserve is Piihonua, embracing 33,941 acres of government land. This was held under lease by the late John T. Baker until March 21, 1921, when the lease expired and the land reverted to the Territory.

The lowest part of any of the reserve lies at the elevation of 1400 feet above sea level on Awehi Stream west of the town of Hilo, and the highest part is found at the upper end of Piha at an elevation of about 6,750 feet. The heaviest rainfall between these limits occurs between the elevations of 2,500 and 4,000 feet above sea level. In general, the reserve consists of a solid belt of almost impenetrable forest, in a region of heavy rainfall, 20

miles long from north to south with an average width of 10 miles lying on the gentle slopes of the huge mountain mass of Mauna Kea. This slope is cut up by innumerable eroded gulches and one may follow along the lower boundary of the reserve and observe more than 100 perpetual waterfalls.

The forest growth consists chiefly of *ohia lehua* with the usual undergrowth of tree ferns and *ieie* vines and a ground cover of countless other ferns, shrubs and vines, an ideal com- [page 170] bination for the conservation of water. On the well drained slopes, especially at the higher elevations, extensive groves of *koa* trees are found, and in the highest portions the *mamani* tree occupies the drier situations. In the wet forest other trees such as the *kopiko*, *kolea*, *olapa*, *pilo*, and *naiio* are also found.

The Hilo Forest Reserve would have served a greater usefulness in the way of water conservation if it had been found feasible to include originally a larger area of forest land and to protect all of the forest on this area from the very start.

The work of three agencies has resulted in confining the reserve to its present size. Grazing interests on the west or upper boundary have encroached upon the forest to an undesirable extent and would still like to send their destructive stock even deeper into the forest. This, in fact, is being done on some of the private lands within the recommended forest reserve boundary, and the only way to terminate it will probably be by the purchase of the lands by the government.

On the east or lower boundary, cane cultivation has removed hundreds of acres of heavy forest. This is a proper use of the land when kept in cultivation to cane, but when such land is abandoned, allowed to grow up in Hilo grass, and then pastured without adequate fences on the boundary line, the result is further destructive of forest growth by grazing and a pushing back of the heavy forest.

In the past on some of the government lands homesteads have been surveyed out and opened to settlement on parts of this lower forest without adequate thought as to the best use of the land. Some of these in swampy and rainy country have been abandoned and some have never even been taken up.

In all such matters there is necessarily a give and take depending on the highest use to which the land should be put. Several interests, however, seem to be oblivious of the usefulness of the Hilo Forest Reserve as a whole and would "kill the goose that laid the golden egg" for some temporary gains rather than join in the general scheme of forest protection for the benefit of the leading industry and the community as a whole.

In order to ascertain exact conditions on the ground an intensive field study was begun early in May, 1921, by a party of Territorial officials who are resurveying the lower boundary and reporting on all situations as observed [see map in *Figure 13*]. This work will be completed in a short time and will result in adding about 2,500 acres of unleased government forest land to the reserve along the lower boundary and increasing its size as well as usefulness.

The investigation, which has been made under adverse weather conditions, has resulted in surveying and marking the new forest boundary at the rate of about eight miles per month, and has disclosed such situations as unbuilt or wrongly located fences required by general leases and homestead agreements issued by [page 171] the land office, unlawful grazing, illegal wood cutting, and the presence of wild cattle on the reserve.

Steps have already been taken to correct such situations and it is planned to exterminate all wild stock in the reserve, to complete the fencing of the boundary at the earliest possible date, and to place a competent ranger in charge. Because of various ownerships of land in this important reserve, it is necessary that all parties cooperate with the utmost harmony in order to bring this work to a satisfactory conclusion... [HFA, 1921:172]

...The work of delineating the *makai* boundary and surveying additional areas to be included in the Hilo Forest Reserve continued during the month and resulted in the running of 7.5 miles from Pohakupuka Stream to Kaula Gulch at the extreme north corner of the reserve. A visit was made to the survey crew and the boundary line was inspected across the lands of Piihonua, Waipunalei, Piha, Opea Peleau and Kaiwiki 3. [page 223]

Fencing Requirements

During the course of my forest inspections the following instances of unfulfilled fencing requirements or of incorrectly located fences came to my attention and were at once reported to the Commissioner of Public Lands with the suggestion that he compel the lessee or homesteader to comply at once with the fencing requirements on the proper lines...:

4. Hilo Forest Reserve. Weloka, general lease 946 to Laupahoehoe Sugar Co. Supposed to be adjacent to *makai* forest reserve boundary, but upper fence of lease found to be about 700 feet *mauka* in the forest reserve.

5. Hilo Forest Reserve. Laupahoehoe, general lease 926 to M.P. Silva. Very frail fence found to be 1,330 feet at the NW. corner and 342 feet at the SW. corner *mauka* of the correct forest reserve boundary, and as a result about 98 acres of forest reserve land were being illegally grazed and the forest cover thereon destroyed.

6. Hilo Forest Reserve. Adjacent lot 51 of the Hakalau-iki homesteads, held under general lease 984 by Rose de Lima. Inadequate fence on *mauka* line of her lease, which allows cattle to get into the forest... [HFA, 1921:224]

Chas. J. Kraebel, Assistant Superintendent of Forestry, reported in August 1921, on the boundary survey, of lands in the Hilo Forest Reserve (*Figure 13*), and reported on a field trip to Mauna Kea. Kraebel and survey party found that the *mauka* boundaries of many of the homesteads had been pushed too far inland, thus impacting the forests meant to be protected. Kraebel also described the tree planting efforts around the mountain lands, conducted in partnership with A.W. Carter of Parker Ranch:

...I respectfully submit the following routine statement of my work during August, 1921.

Boundary Survey

At the end of the month the survey of the *makai* boundary of the Hilo Forest Reserve had reached the point in Kaula Gulch called "Paeooupu," which is the extreme north corner of the reserve and therefore the end of the *makai* boundary. The distance covered by Mr. Hockley's party during August is approximately 7.5 miles, extending from Pohakupuka Stream at Waikaumalo to Kaula Gulch between the lands of Ookala and Manowaialee. At Waipunalei Mr. Hockley found it necessary to make a complete resurvey of lots 12 and 13 of the Kahoahuna Homesteads in order to correct an error in the original survey and to determine the forest boundary in that vicinity. In the course of the month's work several irregularities in the location of fences were disclosed. The *mauka* fence of lot 55,

Waikaumalo Homesteads is several hundred feet *mauka* of its correct position, infringing thus upon the Robertson Estate land of Mauluanui. *In Laupāhoehoe, the mauka fence of the government remnant under general lease 946 is approximately 700 feet mauka of the true boundary; while on the government remnant under lease 926 the present fence is 342 feet mauka at the south end and 1,330 feet mauka at the north end of its true location.* In Waipunalei, because of the peculiar status of that land at present, I requested the surveyor to carry the line straight across this land from the west corner of the land under lease 926 to the newly established south corner of lot 13, Kahoahuna Homesteads. *The land of Waipunalei cannot be regarded as forest reserve at present, since the upper portion constitutes a paddock of the Parker Ranch and the lower portion is used as a pasture by homesteaders under permit from the Laupāhoehoe Sugar Company. The effect of this use is to separate the forest in the government land of Humuula from the remainder of the Hilo Reserve, a condition which should be corrected as soon as possible.*

At the end of the month the following portions of the boundary survey remained still to be done: From Hanawai Stream in Papaikou to Puu Kauku, a distance of about two miles; the final line of 1.2 miles across Piihonua and Waiau from Hookelekele Stream to Alae Stream; the inclusion of the area of Piihonua lying between Hookelekele Stream, Wailuku River, and the land of Punahoa 2; determination of the Punahoa 2-Piihonua boundary from the Wailuku River to the top of the land of Punahoa 2, approximately 7 miles of straight line.

Parker Ranch

On August 1, in company with the Chief Plant Inspector, I drove to Waimea to consult with Mr. Carter on the forestry problems of the Parker Ranch. The ranch is well equipped to raise in its own nursery all the common species of trees for windbreak purposes, but Mr. Carter is anxious to be supplied with the less common introduced species for [page 225] experimental planting. This is an excellent opportunity for experimentation in a thorough manner and on a scale which the Division of Forestry is unable to practice independently. There is almost no limit to the range of climatic conditions which can be found on the Parker Ranch, and Mr. Carter would be at pains to help us find the most favorable site for each species. *The conifer plots established ten years ago on the slopes of Mauna Kea are examples of the excellent results which can be obtained by this sort of cooperation.*

At the time of our visit there were some 300,000 transplants in the ranch nursery, including the genera Eucalyptus, Acacia, Araucaria, Cypressus and Pinus. It is obvious that such vigorous efforts in forestry deserve our most hearty support... [HFA, 1921:226]

The Laupāhoehoe Natural Area Reserve (1983)

In 1983, the Laupāhoehoe Natural Area Reserve was established by Executive Order No. 3168 (Governor John Waihe'e), removing from the Hilo Forest Reserve approximately 7,894 acres of highly valued native forest land and resources. The reserve protects a diverse rain forest ecosystems, and was described in a draft management plan prepared by the Department of Land and Natural Resources in 1983. The plan (DLNR, 1983) provides readers with an overview of the Laupāhoehoe Forest Lands, and describes the importance of these lands to the proposed Laupāhoehoe HETF program. Excerpts from the Draft Management plan follow below.

Description of the Laupāhoehoe Natural Area Reserve and Resources

The Reserve, in the North Hilo District on the island of Hawaii, stretches from just above 1,600 feet to about 4,600 feet elevation and includes several stream drainages. Hakalau National Wildlife Refuge is adjacent to Laupahoehoe Reserve, and protects habitat for several endangered forest birds known to occur in Laupahoehoe as well. Five native natural communities were observed in the Laupahoehoe Reserve during the survey, including a tall-stature *koa'ohi'a* forest in both montane and lowland zones, *'ohi'a/hapu'u* (*Cibotium* spp.) forest, *Carex alligata* wet grassland, and non-native dominated patches.

Laupahoehoe Natural Area Reserve occupies 7,894 acres in the North Hilo District... Elevations range from 1,700 - 4,700 feet, and the wet forest vegetation reflects the area's windward exposure, which receives an average of 160 inches of rain per year (Giambelluca, Nullet, and Schroeder 1986). The adjacent Hakalau National Wildlife Refuge, administered by the U.S. Fish and Wildlife Service, forms the eastern boundary of the Reserve. Blair Road provides access along the Reserve's western boundary. The state-owned Hilo Forest Reserve forms Laupahoehoe Reserve's southern and western boundary; *koa* used to be logged from the forest reserve, just *mauka* of Laupahoehoe's upper boundary. Several streams cross the Reserve, including Kilau, Haakoa, Kaiwilahilahi, and Pahale. A public right-of-way exists through Hamakua Sugar Company lands which allows access into the lower Reserve at Kilau Stream.

Flora

The Laupahoehoe Reserve contains four native communities, as well as areas of non-native dominated vegetation. *Koa'ohi'a* forest was observed to dominate the lowland area, and stretched up into the montane zone (above 3,000 feet elevation). *'Ohi'a/hapu'u* (*Cibotium* spp.) wet forest and *Carex alligata* wet grasslands were also seen in the Reserve's montane area. The forested communities contain rare plants and provide important forest bird habitat, though none of the communities is considered rare. Some mixed non-native tree plantings occur at the lower boundary of the Reserve and in the east corner, but do not form a significant portion of the Reserve and are not described here...

In the Laupahoehoe Reserve, *Koa'Ohī'a* Montane Wet Forest was observed from the upper boundary down to about 3,000 feet elevation, where it graded into a lowland *koa'ohi'a* wet forest, changing in subcanopy species composition. The trees in the montane area formed an open to closed canopy (about 100 feet in height) with a very well-developed subcanopy of tree ferns (*Cibotium glaucum*, *C. chamissoi*, and *C. hawaiiense*). Several large, emergent individuals of *'ohi'a* and *koa* were observed. Trees in the secondary tree layer included *olapa* (*Cheirodendron trigynum* ssp. *trigynum*), *kawa'u* (*Ilex anomala*), *kolea* (*Myrsine lessertiana*), and *pilo* (*Coprosma rhynchocarpa* and *C. pubens*). In the understory, native shrubs included *'ohelo kau la'au* (*Vaccinium calycinum*), *'akala* (*Rubus hawaiiensis*), *Cyrtandra* spp., *Clermontia parviflora*, *mamaki* (*Pipturus albidus*), *manono* (*Hedyotis terminalis*), and saplings of *'olapa*, *'ohi'a*, *pilo*, and *kawa'u*. Ferns were often the prevalent ground cover, including *Asplenium* spp., *Dryopteris wallichiana*, *akolea* (*Athyrium microphyllum*), *Ophioglossum pendulum* var. *falcatum*, and *Pleopeltis thunbergiana*. Mosses were more abundant in areas with lighter pig damage, and were generally seen as epiphytes.

On the east side of the Reserve, a large patch of *'Ohi'a/Hapu'u* Montane Wet Forest between 3,500 and 4,500 feet elevation almost bisected the upper area of *Koa'Ohī'a* Montane Wet Forest. A tall (approximately 80-foot) open to scattered canopy of *'ohi'a* with a secondary layer of native trees such as *olomea* (*Perrottetia sandwicensis*),

mehame (*Antidesma platyphyllum* var. *platyphyllum*), *'olapa*, and *pilo* grew over a variable tree fern layer composed largely of *hapu'u*. Under the *hapu'u* layer was a mix of native shrubs, such as *manono*, young *'olapa*, *pilo*, *Cyrtandra* spp., and *Clermontia parviflora*. *Hoi'o* (*Athyrium sandwichianum*) was the most abundant native fern, although *Asplenium* spp., *Vandenboschia davallioides*, *wahine noho mauna* (*Adenophorus* spp.), *Elaphoglossum* spp., and *Pleopeltis thunbergiana* were also present.

Much of the southeast portion of the Reserve is poorly drained, and several low-lying, very wet sections dominated by *Carex alligata* were observed during this survey. This community was often associated with standing water. *Carex alligata* often dominated the vegetation nearly to the exclusion of other species. Species from the surrounding natural communities, such as scattered *'ohi'a*, *'olapa*, and *'ohelo kau la'au*, were also present.

In the Reserve, the entire area below 3,000 feet was considered *Koa/'Ohi'a* Lowland Wet Forest. Under the 80-foot tall closed to open canopy of *koa* and *'ohi'a*, was a secondary tree layer in which *olomea*, *mehame*, *alani* (*Pelea clusiifolia*), and *kopiko* (*Psychotria hawaiiensis*, varieties *hawaiiensis* and *hillebrandii*) were common. Other trees, such as *'olapa* and *kawa'u* were present, but not as common. *Hapu'u* was present, but of lower stature than in the montane *koa/'ohi'a* forest, and formed a discontinuous layer. Common shrubs included *manono*, *pu'ahanui* (*Broussaisia arguta*), *'ohelo kau la'au*, and saplings of *kawa'u* and *'olapa*. The vines *'ie'ie* (*Freycinetia arborea*) and *maile* (*Alyxia oliviformis*) were present, and *'ie'ie* was sometimes abundant. Native fern diversity was good, including *wahine noho mauna*, *Lycopodium cernuum*, *Athyrium* spp., *Elaphoglossum* spp., *Odontosoria chinensis*, and others.

At the lower edge of the Reserve, below 3,000 feet elevation, the understory of the *Koa/'Ohi'a* Lowland Wet Forest was heavily invaded by several non-native plants including strawberry guava (*Psidium cattleianum*), thimbleberry (*Rubus rosifolius*), and various grasses. One critically important weed seen in this area was Koster's curse (*Clidemia hirta*), which was observed at three locations along hunting trails below 2,800 feet. Forestry plantings along the lower boundary and in the east corner include non-native trees such as toon (*Toona ciliata*), *Ficus rubiginosa*, and tropical white ash (*Fraxinus uhdei*).

A total of 12 rare plant taxa have been reported from the Laupahoehoe Reserve...a species is considered rare if it is known from 20 or fewer locations worldwide, or fewer than 3,000 individuals, or if it is listed as endangered. Due to changes in taxonomy, some taxa currently listed as candidate species in the most recent Federal Register may no longer be considered rare by the Hawaii Heritage Program, and their federal status is being reevaluated (Herbst pers. com.)...

Of the 12 rare plant taxa seen within the Reserve, all were seen recently (since 1972), and 6 were observed during this November 1988 survey. Two species of mint were observed during the survey. In *Koa/'Ohi'a* Montane Wet Forest, *Stenogyne macrantha* was seen between Kaiwilahilahi Stream and the Reserve's western boundary. This population is known from previous surveys to extend from 4,200 feet elevation down to 2,600 feet. This vine bears yellowish-green flowers in clusters, and is found in wet forests throughout the Big Island (Wagner et al. in press). The vines seen during the survey were not in flower or fruit.

The other mint taxon, *Stenogyne scrophularioides*, was seen in two locations during the survey. The first population of 50-100 plants was observed near Kilau Stream in *'Ohi'a/Hapu'u* Montane Wet Forest. The second population was seen in Kaiwilahilahi Gulch in *Koa/'Ohi'a* Lowland Wet Forest, and consisted of several small patches of the

vining mint bearing yellowish-green flowers in clusters. This taxon was previously known from only Mauna Loa and Mauna Kea (Wagner et al. in press).

Cyrtandra giffardii was observed during the survey near Kilau Stream in *Koa'Ōhi'a* Lowland Wet Forest. An estimated 30-80 individuals of this tree were seen along transects 1 and 2, some with small white flowers and some with white berries. This population is known to be very large from previous surveys, extending beyond the northwest boundary of the Reserve and south up to 3,800 feet. This is the only population known in the Laupahoehoe area; two other populations are known in the Kulani area of the Big Island (Wagner et al. in press).

Cyanea tritomantha was seen along Kaiwilahilahi Stream in *Koa'Ōhi'a* Lowland Wet Forest, and covering a large area along Kilau Stream. Two saplings of this palm-like tree with prickly leaves were seen, and some mature individuals bore clusters of purple or white flowers up to 3 inches long. This taxon is found on windward Mauna Kea and Mauna Loa and in Waipio Valley on the Big Island (Wagner et al. in press).

One *Gardenia remyi* tree of poor vigor was seen in Pahale Gulch in *Koa'Ōhi'a* Lowland Wet Forest. This tree generally bears fragrant white flowers, and is found on Kauai, Molokai, and Maui as well as the Hilo and Puna districts of the Big Island (Wagner et al. in press).

Two populations of *Platydesma remyi* were observed during the survey. One was near Kaiwilahilahi Stream and the other near Pahale Stream, both in *Koa'Ōhi'a* Lowland Wet Forest. The Pahale Stream population consisted of only one plant, while the other population is known from previous surveys to extend from 2,400 to 3,400 feet elevation. Neither population was flowering or fruiting at the time of the survey. This shrub bears small inconspicuous flowers, and is found throughout the Hamakua-Kohala area of the Big Island (Wagner et al. in press).

Six taxa within the Reserve were not seen during the survey: *Cyrtandra tintinnabula*, *Huperzia mannii*, *Joinvillea ascendens* ssp. *ascendens*, and three mint taxa: *Phyllostegia floribunda*, *P. longipes*, and *P. vestita*. All of these taxa were seen since 1977, and it is most likely that they still occur within the Reserve. *Asplenium schizophyllum* was seen outside the southwest boundary of the Reserve in 1937, and could be discovered in the Reserve during future surveys.

Fauna

Forest birds make up the native vertebrates known from Laupahoehoe Reserve. Common native forest birds were observed during the survey in all of the Reserve's vegetation types, but were most prevalent in closed-canopy forests of *koa* and *'ohi'a*. (Taxonomy used in this section follows the Checklist of the Birds of Hawaii by Pyle, 1988.) A complete list of bird species known from the Reserve area is in Appendix 4.

Most of the more common forest birds known from the Reserve area were seen during the survey. *'Amakihi* (*Hemignathus virens virens*), *'Apapane* (*Himatione sanguinea sanguinea*), *'I'iwi* (*Vestiaria coccinea*), *'Oma'ō* (*Myadestes obscurus*), and *'Elepaio* (*Chasiempis sandwichensis sandwichensis*, recognized by Scott et al., 1986, as *Chasiempis sandwichensis ridgwayi*) were heard frequently in the Reserve's higher elevations and more intact forests. As has been observed before, *'I'iwi*, *'Apapane* and *'Amakihi* were seen feeding on flowers of the non-native banana poka (*Passiflora mollissima*). Mosquitos were abundant in the lower Reserve and ranged up to 3,300 feet elevation. Only the *'Oma'ō*, *'Elepaio*, and occasional *'Apapane* were observed in the upper portion of the mosquito range.

Four native bird species, all listed endangered by the U.S. Fish and Wildlife Service, have been reported from the Reserve area. Two of these, the Hawaiian Duck or *Koloa maoli* (*Anas wyvilliana*), and the Hawaiian Hawk or '*lo* (*Buteo solitarius*), were seen in the Reserve during this November 1988 survey on several transects, but no nests were observed. The two other species, Hawaii Creeper or '*Alauahio* (*Oreomystis mana*), and '*Akiapola'au* (*Hemignathus munroi*) were not observed during the survey, but have been sighted in or near the Reserve during the Hawaii Forest Bird Survey (USFWS N.D. a, b). It is important to note that Hakalau Forest National Wildlife Refuge is adjacent to the southern tip of the Reserve where these species are seen regularly along with many other native species. The rare '*Akepa* (*Loxops coccineus coccineus*) is known from Hakalau, but has not been reported from the Reserve area.

During this November 1988 survey, off Transect 2, a *Koloa* was sighted flying from a pond east of Blair Road. *Koloa* have also been observed in 1983 and in 1981 breeding in stock ponds west of the Reserve near Keanakolu (DOFAW 1983). *Koloa* numbers declined dramatically early in this century and by 1949 were considered only visitors in the Big Island. Captive propagation and release have been successful and the *Koloa* has been reestablished in an area of at least 100 square miles from Hawi to Paauilo (USFWS 1978). All releases were in the Kohala Mountains until December 1980, when the Division of Forestry and Wildlife released 58 *Koloa* near the Wailuku River in the Hilo watershed. Much of the Hilo Forest Reserve (which includes Laupahoehoe Reserve) has habitat suitable for *Koloa* (Paton 1981).

The '*lo* breeds only on the Big Island and is widely distributed. It is locally common on the slopes of Mauna Loa, on both the windward and Kona coasts, and to a lesser extent on Mauna Kea (USFWS 1984). Sightings of '*lo* were noted on both the northern and southern boundaries of the Reserve during the 1977 U.S. Fish and Wildlife Service Hawaii Forest Bird Survey, and observations also occurred numerous times adjacent to the Reserve (USFWS N.D. a, b). A nest with a young chick was observed in 1971 and 1979 in the vicinity of Keanakolu forestry cabin, several miles west of the Reserve (Griffin 1985). While '*lo* were seen during the November 1988 survey, no nests were observed.

The Hawaii Creeper, or '*Alauahio* (*Oreomystis mana*), is known from the Big Island's Kona, Kau, and windward areas. One of Hawaii's more abundant endangered forest birds, it was observed in and around the Reserve several times during the 1977 USFWS Forest Bird Survey (USFWS N.D. a, b). Only in Kau and the windward areas are Hawaii Creepers found below 3,600 feet elevation; they tend to be most common above 4,921 feet (Scott et al. 1986).

The '*Akiapola'au* (*Hemignathus munroi*) exists only on the Big Island with its largest population on the windward side between 4,265 - 6,234 feet elevation (Scott et al. 1986). This species was seen during the USFWS Forest Bird Survey less than half a mile from the southern tip of the Reserve. It was also observed several miles west and south of the Reserve, and has been seen regularly in Hakalau Forest National Wildlife Refuge, adjacent to the Reserve's southern boundary (USFWS N.D. a, Scott et al. 1986).

Non-native birds observed during the survey included *Hwamei* (*Garrulax canorus*), Japanese White-eye (*Zosterops japonicus*), Red-billed Leiothrix (*Leiothrix lutea*), Northern Cardinal (*Cardinalis cardinalis*), Wild Turkey (*Meleagris gallopavo*), and Kalij Pheasant (*Lophura leucomelana*). The *Hwamei*, White-eye, and Leiothrix were distributed throughout the Reserve and noticed in all vegetation types, while the Kalij Pheasant and the Wild Turkey were noticed near Blair Road on the edge of *koa'ohi'a* forest above 2,500 feet.

Spoor, scat and feeding damage of feral pigs were encountered on every transect, and several pigs were seen. No recent evidence of cattle was seen in the Reserve. A summary of damage and threats posed by these non-native mammals is discussed in the Ungulate Control program.

Native invertebrates, including several guilds of insects, spiders, and snails were observed in the Laupāhoehoe Reserve during this survey. Where native vegetated communities were intact and most diverse, there was an observable parallel in invertebrate diversity. The potential for invertebrate research in the Reserve is great, and it is likely that undescribed species await discovery and description... [DLNR, Draft December 1983:1-13]

KAMA‘ĀINA RECOLLECTIONS: EXCERPTS FROM ORAL HISTORICAL ACCOUNTS

Over the last ten years, we have conducted a number of detailed oral history interviews with elder *kama‘āina* of the mountain lands of the Hilo and Hāmākua Districts. Because of the nature of historic land use and residency, most of the elders who have first-hand knowledge of the Laupāhoehoe vicinity forest lands were all associated with ranches that held either fee-simple or leasehold interest on the land. It was not until the 1950s, that the Territorial (later the State) public hunting programs began, and that the general public was allowed to access sections of the public forest lands. Prior to the 1950s, the ranches and lessees controlled access, and travel across the land was almost uniformly limited to employees of the lessee-land owners. In the 1930s, the Territorial Forestry program, in cooperation with the Federal Civilian Conservation Corps (CCC), undertook a program of fencing and hunting undesirable animals from the forest and mountain region preserves. After the end of World War II, this evolved into the public hunting program, but at that time, Territorial Fish and Game personnel acted as guides for the hunters—thus, access was still controlled.

The interviews cited below, come from the personal experiences of old-time cowboys and CCC-Fish and Game program participants. As would be expected in this age, most travel in the forest lands was restricted to areas where livestock occurred and ranching or forest work could be undertaken. Through much of the 1900s, the deep forests were not frequented on any regular basis. A few ranch and *ahupua‘a* (*mauka-maka*) trails were the primary routes of access through the forest region.

We are particularly indebted to a number of elder *kama‘āina*—many of whom have passed away—who have shared some of their experiences and history with us over the years. Through their personal experiences and work with elders of their time, they share with us descriptions of the land, sites or features, and changes in the landscape observed over the years, that would otherwise be lost. The interview narratives focus on the upper Laupāhoehoe and neighboring forest lands.

Toshi Imoto (with Iris Imoto-Camara)* *Oral History Interview with Kepā Maly* *September 25, 1998

The late Toshi Imoto was born at Pu‘u ‘Ō‘ō Ranch in 1928, the son of Muranaka (of Japan) and Suzuki of Pāpa‘aloha. Muranaka, Mr. Imoto’s father came to Hawai‘i around 1890. After a short time on Kaua‘i, Muranaka moved to Hawai‘i, and went to work for Governor John Baker, who also had the lease of Government lands in Pi‘ihonua—the lease eventually became Pu‘u ‘Ō‘ō Ranch. When Baker sold the Lease to William H. Shipman in 1899, Muranaka stayed on at Pu‘u ‘Ō‘ō in the employ of W. H. Shipman.

Being raised at Pu‘u ‘Ō‘ō, Toshi Imoto, was always surrounded by Hawaiian cowboys, and at an early age, he himself got involved in ranching operations. Ranching was his life-long career of choice, and between 1945 to 1993, Mr. Imoto’s work took him all around the mountain lands, and he learned about many of the trails and features from the older Hawaiian cowboys.

In the following narratives, Mr. Imoto shared his recollections of ranch operations and travel between the Pu‘u ‘Ō‘ō and Kūka‘iau (‘Umikoa) ranch lands; run of the cattle; and changes in the forest. Mr. Imoto released his interview on October 2nd, 1998.

KM: *Aloha. We’re just going to talk story, okay?*

TI: *Yes.*

KM: *I’m here with Mr. Toshi Imoto and his daughter, Iris. Thank you so much for being willing to talk story.*

TI: Yes.

KM: Could you please give me your full name and date of birth?

TI: Toshio Imoto. I was born October 19, 1928.

KM: Okay. So you're coming close to your 70th birthday now.

TI: Seventy, yes. Next month I make 70.

KM: Hmm. Where were you born?

TI: Up at Pu'u 'Ō'ō Ranch.

KM: How did you come to be born at Pu'u 'Ō'ō?

TI: Because my father was working there, and my mother used to be up there too, with my father.

KM: Hmm, I see. Now, Pu'u 'Ō'ō was a ranch?

TI: Yes. At that time it was Shipman's, W.H. Shipman.

KM: W.H. Shipman. So your papa was a cowboy?

TI: Yes, he was a cowboy.

KM: What was papa's name?

TI: Up there, they called him, not Imoto, but they used to call him Muranaka.

KM: Muranaka?

TI: Yes. They don't know him by Imoto, they call him by Muranaka.

KM: Oh yeah?

TI: Yes... ..he always used to love horses, even in Japan. He grew up with horses.

KM: Ohh! So your papa came to Hawai'i; did he meet, and go right to work with Shipman, or did he work ranch somewhere else?

TI: No, he went right with Shipman. Well, at that time, he ended up...it was John Baker's place.

KM: Oh, it was John Baker's?

TI: Yes.

KM: Do you have an idea about when that was? It was before you were born, yeah?

TI: Oh yeah! Way before I was born. Because, I'm way on the end, born already. I have only two more below me.

KM: Hmm. You said that you think John Baker was the owner, just before W.H. Shipman?

TI: Shipman, yes.

KM: Okay—

[John Tamatau Baker was a *hapa-haole* business man and friend of King Kalākaua, and member of the Privy Council. Baker's wife, Chiefess Ululani, served as governess of the island of Hawai'i in the 1880s. In between 1892-1893, Baker also served as Governor, and later as Hilo Road Supervisor. In 1887, John Baker obtained a lease for a portion of the land of Pi'ihonua, including the area that became Pu'u 'Ō'ō Ranch. In 1899, he sold his ranching operation and the Pi'ihonua lease to W.H. Shipman.]

TI: Yes, he worked for John Baker. Baker, he liked *kālua* dog. So my father's job, used to be that he got to take care the dogs too. And they castrate the dogs and then raise the dogs. Once a week, he had to *kālua*. Every week.

KM: Oh yeah, *mauka* there?

TI: Yes.

KM: What kind of wood did they use?

TI: Oh, I don't know. And up there, no more *tī* leaves eh.

KM: 'Ae.

TI: I know my dad used to use *koa* leaf.

KM: *Koa* leaf, as the *hāli'i* [covering], on top?

TI: Yes, yes. And under.

KM: And what, how was the meat?

TI: Good, yeah.

KM: 'Ono?

TI: Yes, good, even the pig.

KM: Hmm, that's amazing. I wonder, *māmane* like that, when dry, would burn hot eh. It's a hard wood.

TI: Oh yes. But mostly, they used the '*ōhi'a*.

KM: So you think that '*ōhi'a* was their main wood the *imu*?

TI: Yes, because *māmane* burns hot, but no more charcoal. It turns to dust.

KM: Hmm, the whole wood goes eh.

TI: It goes quick. Like '*ōhi'a*, they have charcoal, and it stays hot, you know, for *kālua*.

KM: Hmm. [pauses] Now your mama?

TI: My mother was born in Hawai'i.

KM: What was mama's name?

TI: Suzuki. She comes from the Suzuki family.

KM: Ohh. And she was born on this island here?

TI: Yes. She came from someplace in Pāpa'aloa, I think.

KM: Oh. So mama was born here...

KM: ...So your family moved up to Pu'u 'Ō'ō, and you were born up there?

TI: Yes.

KM: As a youth, you worked, you stayed *mauka*. How long did you actually stay living up there then?

TI: I stayed living until I went to school. Pa'auilo School.

KM: So when you reached school age, you came down?

TI: Yes, and I used to stay with my sister.

KM: Oh, an older sister?

TI: Older sister, Natsuko Watanabe. She's still living yet. And her husband, used to work for the railroad. They used to have a railroad eh.

KM: Yes.

TI: He used to stay way down Pa'auilo, by the ocean. Next to the ocean. They had like a hotel for the railroad people eh.

KM: Oh. The railroad ended at Pa'auilo too, yeah?

TI: Yes, right by the mill. Yes, it ended right there, and they used to get like that bus. The riding one, not only for freight. They used to take people too. They'd get to Pa'auilo, right below that Hamakua Mill Company, mill, right below, that's where the train came. And they had that thing [gestures turning around].

KM: A turntable?

TI: Turntable, and they turn and face the other way.

KM: So your sister and brother-in-law took care of the hotel?

TI: Yes. My brother-in-law used to work for the railroad. He used to drive truck for the railroad yard, and he take care of the place too, where they were. So plenty rooms eh, like a hotel. So we used to stay with my sister [chuckles].

KM: Oh, nice eh? [chuckling]

TI: Yes, we stayed down there. Was some walk you know, from Pa'auilo School, about two miles.

KM: Hmm. Now, when you went to Pa'auilo, how did you go? Did you come down from Pu'u 'Ō'ō into Hilo, or did you go the old *mauka* trail?

TI: We go through the old *mauka* trail. We'd go by Keanakolu.

KM: If we look at this map, HTS Plat 613. It shows Pu'u 'Ō'ō.

TI: Yes.

KM: The *pu'u*, and had the house...where the ranch house was?

TI: Yes.

KM: You followed the trail *mauka*?

TI: Yes, past Laumai'a and keep on going.

KM: You pass Pua 'Ākala?

TI: Yes.

KM: Still had a house there?

TI: Oh, Shipman had.

KM: So you'd go past Pua 'Ākala, and you'd walk feet all the way?

TI: No, we used to ride mule.

KM: Ohh!

TI: My father used to lead the mule. We had kerosene boxes those days. The kerosene boxes not too wide, you know. Five gallon [gestures width], two five gallons in one box.

KM: Oh, so it was kind of like maybe three feet long?

TI: Yes, about that. And one mule get two boxes, one this side, and one that side. And we'd stay in those boxes [chuckles].

KM: You guys would ride in the boxes?

TI: Yes.

KM: Wow! So you guys would go *holoholo*, past Laumai'a, Pua 'Ākala, Hopuwai...?

TI: Yes, all the way.

KM: Where would you come down?

TI: We would come down through Kūka'iau Ranch.

KM: What they call that, 'Umikoa Trail?

TI: Yes, 'Umikoa. And then you go down, and we'd come out towards 'O'ōkala. Used to get one store on the highway, Uchida Store¹⁴.

KM: So was Uchida Store, close to where the trail came out from *mauka*?

TI: Before Uchida Store, a little further away. Maybe about one quarter mile away from the store. And we used to leave our horse there... The trail was on the Hāmākua side of Uchida store, that's where we leave the horses. My father used to know those people, and they used to keep the horses for us. And then we'd walk to the store.

KM: Hmm. And then ride the train?

TI: No, we make arrangements, we had cousins, relatives, we used to call.

KM: Hmm, nice. So Pu'u 'Ō'ō, when you were living there, were there plenty of houses?

TI: No. They had a house where the fencing gang lived, and our family house, then right below used to be our house.

KM: And the cowboy house, plenty stayed inside, or only one?

TI: Oh, plenty stayed.

KM: Oh, so like a bunkhouse?

TI: Yes, bunkhouse. Had one small bedroom, that's where the boss used to stay, the foreman¹⁵. And the bigger side, that was like a bunkhouse. Plenty, all in there.

KM: About how many people were working up there, when you were young?

TI: [thinking] We had Ochi family too.

KM: Oh, Iris brought out a picture of Pu'u 'Ō'ō.

TI: Yes.

KM: This is...?

TI: Pu'u 'Ō'ō. [pointing to areas on the photo, left to right] This used to be the storeroom. Had all kinds of barley and things in there. This is where they had coal and everything for shoeing, they shoe the horse. And this used to be the smoke house where we smoke our meat. Smoke pork.

KM: Hmm. Now, I see another house behind here.

TI: Yes, that's the big house where Shipman them would stay.

¹⁴ Uchida Store was situated approximately 200 feet on the *makai*, Hilo side of the present-day Kealakaha bridge (at the 32 mile marker on Highway 19), in the district of Hāmākua.

¹⁵ Pu'u 'Ō'ō foremen – “When I was young, the foreman was Solomon Kauwēnui, they called him ‘Kona.’ Then later, Tommy Lindsey was the foreman” (pers comm. October 2, 1998).

KM: Hmm. And then this house in front, with the big veranda, *lānai*—it looks like in front—that's...?

TI: That's where we had like a mess hall. Everybody eats over there. We had one cook, you know, up there. They used to feed us.

KM: Oh, so everyone would come together and eat?

TI: Yes, only my father and myself, when I'm helping up the ranch. I go with the ranch hands eat in there. But my mother and all the people, the families, they eat home. They gotta stay home.

KM: So your house isn't in this picture?

TI: No, no, you cannot see. [gestures, to the outside left of the photograph]

KM: [looking at the photograph] The paddock is going *makai*, and the *pu'u* is going up here?

TI: Yes, but this [pointing to a sloping area of land in the photo], is not the *pu'u*. It's a gradual slope.

KM: Hmm. What are these fence post made out of, do you think?

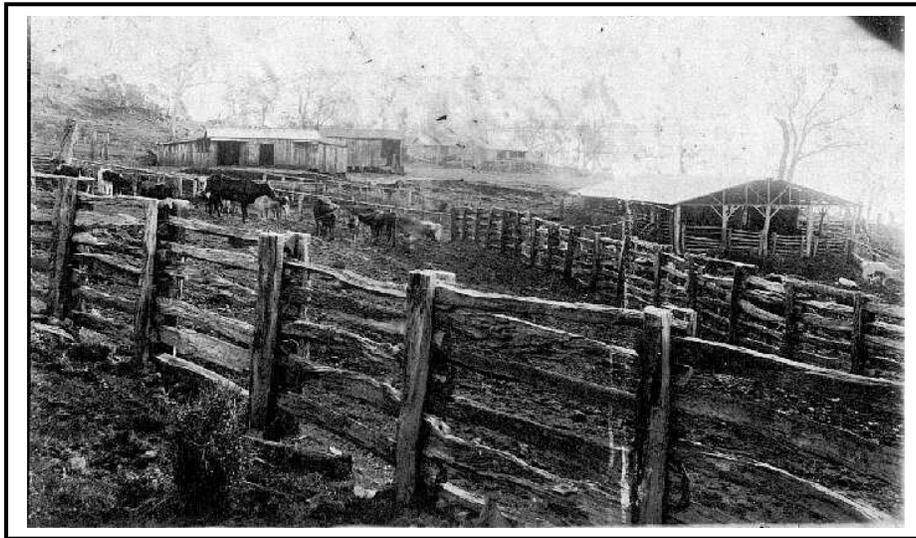
TI: 'Ōhi'a, some *koa*.

KM: Hmm. I see the bark on this one here...

TI: Some is *koa*, and some is what you call *naio*.

KM: *Naio*, hmm. That's what this bark looks like.

TI: Looks like the *naio*. *Naio*, lasts forever, you know. The posts, some over 40 years old, and they no rot (see photo below).



Pu'u 'Ō'ō Ranch ca. 1895 – Paddock and Fences Made of Timber Collected from the Neighboring Forests

KM: So I see, one, two, three, four closed buildings. This is a water tank, or water catchment in there [pointing to an open-walled building]? Is that a water tank in there?

TI: [thinking] Oh yeah, yeah, get one. And that building is where we saddle the horses, and there's a corral behind this that you can't see. Another corral down below. This corral comes all around here. It was all corrals around here [the area around the ranch houses].

KM: Hmm. And then there were more houses a little further up?

TI: Up there. That's where they had the cowboy house, my house, and the fence gang house.

KM: So the fence gang, was it mostly wooden fences, or did they still make *pā pōhaku* [stone walls]?

TI: Oh they used to make it all with wood. Those days, was all wood. *Koa*, *naio*, whatever wood, *ōhi'a*. All kinds.

KM: Oh, that picture is beautiful. When do you think this photograph is from, about?

TI: [thinking]

KM: Your time, or before?

TI: Way before. No more trees my time. You can see trees eh, around here [pointing to photograph above]?

KM: Yes.

TI: Now, no more. When I was born, already, no more trees.

KM: So this picture is before your birth time?

TI: Oh yes. And right now, there's that *sugi* trees around there. Shipman brought that.

KM: Oh, yes, that's a nice tree.

TI: Yes, *sugi* trees, all *sugi* trees around there.

KM: Hmm. Interesting. So, had Japanese ranch hands, had Hawaiians too?

TI: Yes, Japanese, Hawaiian, Portuguese. Not too much Japanese, but the fence gang used to be.

KM: So the fence gang was mostly Japanese?

TI: The guys that fix the fence, yeah. Japanese, old guys.

KM: But your papa took care of the horses, took care of the dogs like that?

TI: Yes. The young ones that used to be cowboys, were way older than me. The Ochi family.

KM: Hmm. How about some of the other family names, do you remember some of the people; the Hawaiians and Japanese families?

TI: Oh, the cook over here was Onodera.

KM: Onodera, Japanese?

TI: Yes, Japanese cook. Balla-head too. [smiling]

KM: [chuckles] But what, the food was *'ono*?

TI: Oh yeah, good [chuckles]. Used to be alright, cook all kinds. Yes. But after that, when I was working with the cowboys already, how many changes already. Some wife and husband. One to take care of the house, one to cook.

KM: Yes. Who were some of the Hawaiian families that you remember?

TI: They used to change. Used to be that they would come from Kea'au.

KM: Oh, the Kea'au families, like Haa?

TI: Yes, Haa. There's one more Haa still alive eh?

KM: Yes, Albert.

TI: Yes, I know him too, when he was small. Albert, Albert's father, Eddie Haa. And Henry Haa, used to drive for Shipman.

KM: Oh... Did you hear anything about Henry Haa?

TI: Henry, he used to be next to Ka'iawe. That was another Hawaiian, Ka'iawe.

KM: Hmm, David?

TI: David.

KM: So they would come *mauka*, work with you folks? David and Henry?

TI: David used to be the foreman. A big guy. Big David, we used to call him. David Ka'iawe. And the only guy who didn't come work up here, work with the cowboys, was Kekuawela. His name was David too. We called him Small David, and he came from Laupāhoehoe, some place.

KM: So Kekuawela wouldn't come work with you folks, *mauka*?

TI: No, he stayed Kea'au.

KM: Hmm. When you were growing up, you said that you were ten years old and you started doing some ranch work?

TI: Oh yes, we used to go... And at one time, me and my brother, the one right above me... His name was Takara.

KM: So you folks would go work?

TI: Yes, cowboy. Come home, we'd get on the horse and help them drive, when they drive the cattle. Sometimes when we're not working with the cowboys, we work with the fence gang too. Dig holes, pull post. With the horse, you know, you pull the pole.

KM: Ohh! So would you folks just go, and cut whatever trees you wanted, then let them dry, and put 'um in the ground?

TI: Yes. All close to the fence line area, so we no need haul 'um too far to the fence. When we're building fence. But some places, no more trees close to the fence, so we got to drag them a long way.

KM: The *pipi* [cattle] clear everything out yeah?

TI: Yes.

KM: So the forest must really have changed too?

TI: Change, change. All the time changing. And mud some places too, had a lot of mud. The horses don't like the mud, especially the new horses.

KM: The dirt up there in places, is powdery too, eh?

TI: Some powdery and some sticky too. [gestures, sinking in the mud and then scraping off the sticky mud from the horse's legs].

KM: Oh, so sink up to the belly?

TI: Yes, and some, they fight the mud, you know. They get played out. New horses.

KM: Hmm. So would you say that maybe there were fifteen people living *mauka* there, in your time, or more?

TI: Yes, about that, about fifteen.

KM: And I guess, as you said, they'd rotate sometimes.

TI: Yes, we get more than fifteen when we working cattle eh. All the Kea'au ones come up too. Like David, Big David, Eddie Haa, and whoever there was.

KM: Yes. Where did you folks drive your *pipi*? [pauses] What did you do with the *pipi* when you were ready to ship them?

TI: Oh, we used to take them to... We'd end up in Keauhou, Keauhou Ranch...

KM: Now, if I can go back for a moment, the trail going towards Laumai'a side, did it begin right at the Pu'u 'O'ō ranch house?

TI: Oh yeah, right there is the trail.

KM: So the Pu'u 'O'ō trail started right there?

TI: Yes, you go through the back.

KM: From the back of the house?

TI: Yes, and hit the trail, going. And we cut up and hit this road [the main Mauna Kea Forest Road]. Pass Keanakolu, and then go down to Kūka'iau Ranch, 'Umikoa.

KM: So you would actually go down, all the way to 'Umikoa?

TI: Yes.

KM: You come down Kūka'iau-'Umikoa, and then you would cut back a ways towards Hilo side?

TI: Yes, and go down. We never go down Humu'ula before. We always go down past Keanakolu.

KM: So you pass Keanakolu and go down 'Umikoa?

TI: Yes...

KM: ...When you folks would drive *pipi* around here [pointing to Pu'u 'O'ō vicinity], did you ever have to go up the mountain side, Mauna Kea, to get *pipi* that had gone off?

TI: No, never.

KM: All fenced in?

TI: All fence line, and Shipman didn't go off Humu'ula. That was Parker Ranch.

KM: So Shipman's place was all...?

TI: All State [Territorial] land, Hawaiian Homes Land, and the land past Pua 'Ākala, going towards Keanakolu, was different leases, that. All different leases.

II: Was that Lili'uokalani land?

TI: Honohina, I think so. That's where we used to fatten the steers.

KM: Hmm. So you folks stayed Hāmākua side, Pi'ihonua through Hāmākua, like that?

TI: Yes, Pua 'Ākala, Pāpa'ikou, Hakalau.

KM: So your *pipi* were going all through here? [pointing to *mauka* lands on map] So Laumai'a side like that?

TI: Oh yes, below Laumai'a. Right below Laumai'a, you know, was our land too.

KM: So you folks never needed to go *mauka*?

TI: No. Our cattle were right there, our boundary goes right below Laumai'a house. It goes down towards Pauka'a.

KM: Okay. The trail that you folks followed, going around to Laumai'a side like that, was clearly marked? Can the trail still be seen pretty good, or did that become the roadway?

TI: To Pua 'Akala, we used to take our horses. But now, in the pastures, there's all kind names. Each paddock.

KM: So each one had it's own name?

TI: Oh yeah. From our house had what they called Kaleponi. Kaleponi is right beside the house here. That's the first one. Then comes Number One. Then past Number One, is called Pā Wahine. And past Pā Wahine, Pā Laho'ole. Then comes Keanakanuha. And after Keanakanuha, comes Pauka'a. Pauka'a and then right next to the Pua 'Akala, is Pā Waiu.

KM: So you folks had all these names. Big paddock areas?

TI: Oh yes. And this is the top end, Kaleponi. Then after that [gesturing divisions down slope] you get Number One, Two, Three, Number Four. You go all the way in the forest, *makai*. But like Pā Wahine, goes around like this [gesturing].

KM: Like the top of a triangle?

TI: Triangle, yeah. Because of the gulch, too much fence. Big ones [paddocks], right into the forest. Number One; Keanakanuha, *mauka* and *makai*.

KM: Hmm... ... The Hawaiian guys didn't talk story too much, about the old places?

TI: Yes, they never say. That guy who used to talk story about all kinds, was Eddie Haa. That's the guy, he'd talk all old times, all kinds of things he knows. He knows about these *kahuna* guys. And he knew about, one guy in Waipi'o, he said had one guy, he was half shark. And he said, when this guy, he asked the boys, "Where you folks going today? Today, nice day, where you folks going?" And I guess, after a while, the boys they don't tell him where they're going. That guy, half shark, and he going follow them. When they say where they going, he jump in the water, and he go [chuckles]. He turned into a shark, and he eat the boys. All kinds of stories he tell.

KM: The old people tell those stories, interesting.

TI: Eddie, he knows all kinds of stories, all kinds.

KM: And Eddie was Albert's father?

TI: Albert's father. He knew all those stories. Albert, he doesn't say too much.

KM: Hmm. You know, sometimes...did you ever hear about night marchers along the old trails? Have you heard about them, night time you can see lights along the trails, but nobody is there?

TI: [thinking]

KM: Or anything about the old trails, *mauka*?

TI: No, no. I never see. But some, they say they walk through your house and all.

KM: Yes... ...Did you folks ever drive *pipi* all the way out Kahuku, or did you stay at Keauhou?

TI: No, no, we stayed at Keauhou. When the train was still operating, that flow came down from Mauna Loa, 1942, I think. We couldn't go on the trail. We cannot go. So instead of going that way, we had to go to Kūka'iau Ranch. We'd get into Kūka'iau Ranch and then when we reach the ranch, the manager from there, lend us one cowboy, and he tell us

how to go, take the cattle down to the train station. That's where we loaded the train and shipped 'um to Hilo...

KM: Wow! Who was the cowboy over there, do you remember?

TI: [thinking] That guy that helped us, was a tall Hawaiian, good with the horses. [thinking] John Huli'i, he was a real good horseman. He was good friends with Billy Bergin. He's a veterinarian. I forget his name. That's why, when you get old...

KM: Oh no! Your story is so good, and these recollections of working the land and who the families were. That's so important.

TI: Hmm...

KM: ...So, you look up to the mountain now, what do you feel?

TI: That's the place I used to be before, chase the cattle and all kinds. Hoo, a lot of work!

KM: But good memories? I know it was hard work, but...

TI: But was good fun those days. Good fun! Work hard, but good. I like horses, love to ride horse. I used to like that, but when I got the kids coming up, I had to give up that. No bring enough money in. So I had to find another job. That's why I left up there. I left Shipman. That's when Herbert got mad with me. I took the old man, my father too. See, my father worked for them, right after John Baker, he went with them all those years. He didn't want me to take him. "No, you leave him behind, he's old and he's going to die if you take him to the warm country. He'll get sick. We'll take care of him." But I told Herbert, "No, I'm going to keep him next to me. My papa liked to stay with me."

KM: Hmm... *Aloha* to you, thank you so much.

John “Johnny” Ah San
Oral History Interview with Kepā Maly
September 29th, October 2nd, and 9th, 1998 ¹⁶

The late, John Ah San—affectionately called “Johnny” by all his friends—was born at Laupāhoehoe in 1907. His father came from China in ca. 1875, and his mother, who was of Chinese-Portuguese ancestry, was born at Laupāhoehoe. In the 1920s, Mr. Ah San tried out being a cowboy, which took him up to the forested, Hilo mountain slopes. Deciding against becoming a cowboy, he worked several jobs, until 1933 when he was hired by Lester W. “Bill” Bryan to work in the Territorial Forestry program on Mauna Kea.

During his first two years of work on Mauna Kea, Mr. Ah San walked the entire mountain, surveying and putting up 80 miles of fence line that enclosed the Mauna Kea Forest Reserve. Then in 1935, Bill Bryan brought him in to help set up the Conservation Corps Camp (CCC) program.

During his years with the CCC, Mr. Ah San worked on the establishment of the Mauna Kea cabins, trail and road development, fence line maintenance, planting and forestry programs, and regularly traveled all across the mountain lands. Later he worked in the Territorial- and State- Fish and Game Division program. For almost 20 years, Mr. Ah San lived at Keanakolu, which served as his base of operations for travel on Mauna Kea. After spending nearly 34 years on the mountain lands, Mr. Ah San retired in 1967.

During his career, particularly in the period leading up to and through World War II, Mr. Ah San worked with many of the old Hawaiian cowboys and others who traveled the mountain region. Through individuals like Ioane Haa, Willie Kaniho, Tommy Lindsey, and other old-timers, he learned about some of the Hawaiian sites and traditions of the region. Mr. Ah San also credits Territorial Forester, Bill Bryan for a great deal of what he learned about the history and sites of the area. He notes that Bryan studied a great deal, spoke with many of the old timers and ranch managers, and insisted that everything said about the mountain be historically accurate.

Mr. Ah San’s years of field experience and first hand accounts learned from elder native Hawaiians provide readers with a unique look at the mountain lands. The interviews also provides readers with important documentation on trails; the natural environment; Hawaiian sites; resource management practices; individuals who traveled on and worked in the region; and what was being spoken of in regards to history on the mountain. Of particular interest in the area of Hawaiian sites and practices are Mr. Ah San’s discussions about what he learned from Ioane Haa about *heiau*, and travel upon the Waipunalei-Laupāhoehoe and Kūka‘iau-‘Umikoa Trails to Mauna Kea.

Two additional comments are noted here: (1) during the interview, Mr. Ah San generally pronounced the place name Laupāhoehoe as “Laupāhoe.” In the transcript, the name is spelled out in its standard form as written today; and (2) during the interviews, Mr. Ah San allowed several of his historic photos to be copied and included in the interview.

Mr. Ah San granted release of the interview transcripts and records on October 31, 1998.

¹⁶ On September 29th, Rodney Oshiro – Nā Ala Hele program coordinator with DLNR (Hawai‘i Island), who helped make arrangements for the interview, also participated in the interview. On October 9th, Rodney Oshiro, Pat Thiele (with *Nā Ala Hele*), Paula Cook (Mr. Ah San’s friend), and the interviewer accompanied Mr. Ah San on a field trip along the Mauna Kea mountain road from Humu‘ula to the Keanakolu cabin. Excerpts from the recorded, driving interview are included as a part of this transcript.

Interview in progress— speaking about the introduction of gorse (*Ulex europaeus*) on the Mauna Kea lowlands

JA: ...You know those yellow flowers, plenty down there?

KM: Yes.

JA: Who brought that in, nobody knows¹⁷. If they know, they don't want to go back and say so [smiling]. But that was way...when the first white people went up. And then the gorse was spread by...you know, they had a caterpillar, and they poisoned, and they turned the first gorse that they had and then... That was way over at Pu'u 'Ō'ō. And then after they turned that one over, they had another one over at Kahinahina, and they took that tractor, which was the biggest mistake. You know, the wheel?

KM: Yes.

JA: That tractor carried that. So now, it's the people's fault. And now, they blame this, they blame that. But it was the higher ups, no want to work [chuckles].

KM: Oh, amazing! Now, would you please tell me your full name?

JA: John Ah San.

KM: Where were you born?

JA: Laupāhoehoe [pointing *maka*].

KM: Oh, down at the point, *maka*?

JA: Yes.

KM: What year, what's your birth date?

JA: Nineteen-o-seven, May 26th.

KM: Hmm, so you're 91 now. Hoo! You've seen so much, yeah?

JA: Well, just the ending of the horse and buggy days. That was ending, 1913. And then they had the train come over in 1913. It came as far as Laupāhoehoe.

KM: Oh, so in 1913, the train went as far as Laupāhoehoe?

JA: Yes, they were building the bridges over.

KM: Oh, so you remember riding those early trains, like that?

JA: Yes. I left school at 15, 16, I worked at the railroad porter, at Pa'auilo.

KM: Oh, you went all the way down to Pa'auilo?

JA: Yes.

KM: So where they turned the train around?

JA: Yes. Oh, you heard about that?

KM: Yes. And there used to be a little hotel-like, down near the railroad at Pa'auilo, yeah?

JA: Yes.

¹⁷ When discussing the Humu'ula ranching operation – Mr. Ah San suggested that perhaps it was during A. Haneberg's time (managing Humu'ula Sheep Station ca. 1880s to 1890s), that the gorse was initially introduced – also noting that there was no solid evidence on the matter (pers comm. October 2, 1998).

Subsequent research revealed that by mid 1892, gorse was identified as a pest in Humu'ula, and that the Haneberg operation at the sheep station committed resources to it's control.

KM: So, when you were young—you were born in 1907—and you left high school when you were about 15 years old?

JA: [chuckles] I was kicked out of school.

KM: What, you were too rascal?

JA: Well, had another Japanese boy, rascal. He goosed one girl in front of me [laughs], and the teacher caught 'um and I got the blame.

KM: 'Auwē!

JA: So just like that, the teacher said, "Take all your books, out of school!"

KM: Hmm. So you were living *makai* on the flats then?

JA: Down Laupāhoehoe. I don't know if you go down there, but there is a big banyan tree. That there, was the school.

KM: Hmm. So you lived close by there?

JA: Yes, right above.

KM: So your mama and papa lived down there?

JA: My mother was born down there.

KM: Oh yeah? What was your papa's name?

JA: Leong Soong.

KM: And mama?

JA: Mary.

KM: Are you part Hawaiian?

JA: No. My mother is part Portuguese and Chinese. My father is pure Chinese. We get no Hawaiian blood, only thing we get, brown [rubbing the skin on his arm].

KM: [chuckles] Yes. When did you start working for Forestry?

JA: [thinking] Nineteen thirty-three.

KM: Oh. So in between when you left school, you worked for the railroad...?

JA: When I left school, I worked in the Laupahoehoe Plantation. That's the only place you can go, plantation. I stayed one year. Then I went over to the railroad. Railroad, I worked one year, then I worked for the telephone company, switch board. Laupāhoehoe had one. I stayed there five years. And then there was a fellow that came and inspected the place where they were going to have this telephone. I took him around and tested different... Then he turned around and he told me, "Johnny, you better either go to school and learn wiring, or otherwise, you're too small to work on the poles..." So I didn't like in the house, so I left and I went to work for the County. I worked for the County, driving truck, for five years. [chuckles] Then I got kicked out of County, and I knew Bryan, so I asked him, and I went up.

KM: Who was that, Lester?

JA: Lester Bryan.

KM: You mentioned that you worked for the County, was that in the early 1930s?

JA: Late twenties.

KM: Okay...

KM: [Inquired if Mr. Ah San ever traveled trails in the Puna region, he replied “no,” but recalled a trip to the Shipman home to get *nēnē* for the Forestry Program.]

KM: Oh. So you never walked the side by Shipman’s place, going to Kea’au?

JA: No, no. You know, I only went down there once. You know, Shipman’s house, before, you couldn’t go down. Even if you ask, no dice. Only one time, I had to go down and get the *nēnē*.

KM: Oh, who did you get the *nēnē* for?

JA: See, when we came back out of the Army, and they opened Pōhakuloa. When they got there, and Bryan wanted to keep the *nēnēs*, and from there, it would spread out. But when they got that and they changed and had this Wildlife [division formed], and then the Wildlife came and turned that thing around. Which this guy from Wild Fowl Trust in England (in c. 1950), he came over and started *nēnē* at Pōhakuloa. I forget what year that was [thinking], in 1947. I came back to work right in ‘47 and started the Pōhakuloa cabin.

Then he brought up the *nēnē*, and had them over there. And according to Yealing, they are supposed to be bred in a natural breeding area, and then when they got out, they learned how to fly out. But in captivity, they put them over there... You put ‘um down in Volcano, they follow the cars, they want to eat.

KM: That’s right. So he felt it was better to have them in an open, natural area?

JA: Right. I don’t know whether you work for the Federal, or you work for the State...

KM: No [chuckles].

JA: All what they want, is big numbers!

KM: Hmm, so they breed ‘um in captivity?

JA: Yes.

KM: It’s hard then because when they back out in the wild, they don’t know how to take care of themselves.

JA: Yes. Well, like the Forestry guys, they fight that. You know, when Bryan was, he was everything. You know, what goes to the forest, he was the boss. He takes care of birds, he takes care of...you know, he was overall. Then he had men under him. [chuckles] And he didn’t go for university guys, if they go out... And one guy that he liked, I don’t know if you met him, Dave Woodside.

KM: Oh yes, he’s still working in Honolulu.

JA: That’s one hard working boy.

KM: Hmm. So about 1933 you went to start work on Mauna Kea with Bryan?

JA: Yes.

KM: Where did you work?

JA: Well, when I went work for him, we built the trail around Mauna Kea for the fence.

KM: Okay. I have that map here, HTS Plat 613 [opens map], from the Mauna Kea Forest Reserve.

JA: Yes.

KM: So you did the fence line all the way...?

JA: You know, the Mauna Kea Reserve?

KM: Yes.

JA: We cleaned that fence line, make the trail. And see, I went up in 1933. Then in 1935, I was taken out of the Forestry, and I went Triple C [CCC]. You see, then he put me...I was with another gang, and then I went over there and cooked, cooked for the boys. All around, Mauna Kea, Hualālai, Mauna Loa. Mauna Loa, terrible.

KM: Oh, hard country, yeah?

JA: The rain [chuckles], down below dry, up *mauka*, rain.

KM: So when you walked around Mauna Kea, about 1933-34 you did the Mauna Kea survey for the fence line?

JA: Yes.

KM: When you walked around the mountain, were you with any older Hawaiian guys, who went around with you?

JA: No, no, all by myself.

KM: Oh, you did it by yourself?

JA: Yes.

KM: So you kind of made the determination of where the fence line should go?

JA: No, they had the ranches and then the CCC was put up in 1935. And they had the map up of Mauna Kea, 80 miles of hog-wire fence¹⁸.

KM: Wow!

JA: That was built by man power, no more buster [gestures digging fence post holes by hand].

KM: Yes. Were there any of the old Hawaiian cowboys around, did you work with any of them?

JA: Cowboys were at Humu'ula. And you know, Willie Kaniho, he was the foreman.

KM: Ahh. Then at Pu'u 'Ō'ō Ranch, they had at that side too?

JA: Well, Pu'u 'Ō'ō had several but, Kona [Solomon Kauwēnui] was one of them.

KM: Kona?

JA: Yes, he married a Japanese girl, and he was at Pu'u 'Ō'ō during my time. He was pure Hawaiian, but he married a Japanese girl.

KM: Hmm! Mr. Ah San, when you walked around Mauna Kea, what are some of the places that you stayed at? Where did you stay?

JA: Well, Mauna Kea, they had...Bryan built, during the CCC times, he built cabins. And I think, about every six miles, we had a cabin. Then he took that off, and he left one at Kaluamakani. Had one house, and then Pu'u Kihe, Kūka'iau Ranch, they had one more, but that was built by the ranch. But I could stay there.

And then another one they had, Kahinahina. Kahinahina House, I think is still there. They had one at Humu'ula, but I think they tore that one down.

¹⁸ Mr. Ah San noted that L. Bryan came to Hawai'i after spending some time in the military. He'd also attended forestry school, and had a real interest in botany. He was specifically interested in Mauna Kea and the work of D. Douglas. As it worked out, when he got to the Hawaiian Islands, he was stationed on the island of Hawai'i and had responsibility for Mauna Kea. Early on A.W. Carter had expressed a keen interest in saving Mauna Kea and that work, organized by L. Bryan resulted in the 80 miles of fencing around Mauna Kea (pers comm. October 2, 1998).

RO: Kanakaleonui?

KM: How about the one at Kanakaleonui?

JA: Maybe still there, I don't know.

RO: *Pau* already.

JA: Oh, they took 'um out...

KM: Hmm. You know, you mentioned Pu'u Kihe and these other *pu'u*, Kahinahina like that, when you walked around Mauna Kea... In fact, you know the trail, did you walk the 'Umikoa Trail, you went *mauka* from Kūka'iau side?

JA: Well that's one thing that I never completed. You know that 'Umi's Trail from Laupāhoehoe, go up?

KM: Yes.

JA: I went up behind Kanakaleonui, back to that Red Hill [Kaupō], and then I stopped, and then I came from the top a little ways, then I turned back, you know, never give me a chance to finish it.

KM: Oh, so you went up 'Umi Trail, and up to Red Hill side. So you never went past Mākanaka?

JA: Yes, I passed Mākanaka, but not, what you call, that Red Hill, back of that, then I turned back.

KM: Did you hear the name Kaupō for Red Hill?

JA: Yes.

KM: Did you ever hear of any old, or ever see some of the old Hawaiian *ahu*, shrines or anything up there?

JA: Oh yeah. Well, right back in Kanakaleonui, there is a Hawaiian graveyard. They used to bury there. When they go up and make their adze, and the Hawaiians die up there, they had a little...above Kanakaleonui, in between Red Hill and Kanakaleonui.

KM: [looking at HTS Plat 613] Yes. I see Kanakaleonui here...

JA: Yes.

KM: And there's one little *pu'u*, then Red Hill up here. So was that along the trail where they would bury their people?

JA: Well on the side of the...in between Kanakaleonui and one of the hills.

KM: So was it built up with stones?

JA: Yes, but not much. I think they've been [thinking] destroyed.

KM: Ahh, collapsed, or fell down?

JA: Yes...

KM: So when you walked this mountain area like this, did you see... You know, they made *ahu*, cairns, like shrines on old places?

JA: Yes.

KM: Did you ever see any old shrines or altars where they pray, around the mountain?

JA: No. The only one, you know that Hawaiians...as close as a I get is that three caves.

KM: Ahh, is that Ke-ana-kolu?

JA: That's how they got that name, Ke-ana-kolu, The-three-caves.

KM: Where Keanakolu is today... [looking at HTS Plat 613] Here, this is Keanakolu way down here.

JA: [looking at the map] Yes.

KM: See, here's Waipunalei?

JA: Yes. See Keanakolu, Waipunalei, then you gotta go to Laupāhoehoe.

KM: Okay, there's Laupāhoehoe.

JA: Yes.

KM: So the three caves...actually what they call Keanakolu now, is not where the caves are eh?

JA: The caves are above. You know where Douglas Pit?

KM: Yes.

JA: On the...well, we call it the Hāmākua side. There's a little gulch, then you go up.

KM: Oh, so from Douglas Pit, Hāmākua side, there's a gulch, and you walk up the gulch?

JA: Yes, the old Russian camp [On October 9th, Mr. Ah San reconfirmed that it was his understanding, as told by L. Bryan, that there had been a Russian settlement in the area as well.].

KM: Had Russians up there?

JA: I thought you heard.

KM: No.

JA: Yes, that's where, Keanakolu. You know, Hawai'i, the Russians and the Japanese, they wanted. But the Russians were the first ones. And then they got up there. They were the first ones that built up at Keanakolu.

KM: So you heard that, that the Russians went up Keanakolu?

JA: Yes.

KM: Who did you hear that from?

JA: Bryan. He studied all the history.

KM: Oh. So you go up the gulch, you'll see the three caves?

JA: Well no, you gotta go on the right hand side.

KM: Okay. You mentioned something interesting a little while ago, before we began recording the interview. You said that when your time comes, what do you want to do? What do you want to have happen for you?

JA: I want to go up there. See, I was born down at Laupāhoehoe Point. Now I want to be put up [chuckles], so that I can see the land.

KM: So your ashes, you want them scattered *mauka*? What, scattered, or just one place?

JA: No any way, just as long as I go up there.

KM: So you love that mountain, yeah?

JA: Yes.

KM: Hmm... Did you ever hear of any old Hawaiian *heiau* or anything like that on top of the mountain?

JA: No, I never heard. There's no *heiau* up there.

KM: So you never heard about any *heiau*?

JA: No. *Heiau* is all down below, according to old man loane.

KM: loane Haa?

JA: Haa, yeah. The people...you know, there is a big one down here [gesturing to the Hilo side of his house, on the bluff of Laupāhoehoe], that's 'Umi's *heiau*. But they don't recognize that on the account that it's legend. You know, it wasn't in the time when the white man was here.

KM: Yes, so it's a much older story than that.

JA: Yes, old story.

KM: So you mentioned 'Umi's *heiau* down here at Laupāhoehoe? And then, 'Umi's Trail?

JA: No, 'Umi's *heiau* is not down in the valley, it's right up here on the...you know when you make the turn in the road?

[Register Map 667, of the *ahupua'a* of Waipunalei (1875) depicts the Laupāhoehoe-Waipunalei boundary and portions of the trail as originally surveyed. Mr. Ah San marked the approximate location of the 'Umi *Heiau*; situated just *makai* of the present-day Highway 11, on the bluff overlooking Laupāhoehoe Valley.]

KM: Yes.

JA: It's on the hill, up. If you climb that hill, you'll find 'Umi *Heiau*.

KM: Ohh. How come 'Umi had a trail going up to the mountain?

JA: Well, that's where they made their adze. They go up from Laupāhoehoe, they call the trail...that's where they go up to Mauna Kea. And Mauna Kea, that's the shortest distance. You know people used to come out to Laupāhoehoe and take the trail up. [chuckles] You go from Hilo, it'll take you one week.

KM: Hmm, a long trip. So the Kūka'iau Trail, 'Umikoa and this Laupāhoehoe Trail, are different trails then?

JA: Oh yes, different trails.

KM: So Laupāhoehoe, 'Umi's Trail...?

JA: No, Laupāhoehoe is the true 'Umi's Trail. 'Umikoa one, that's when they go up and they turn around, and they meet 'Umi Trail¹⁹.

KM: Hmm, so they connect with it?

JA: Yes, at Kanakaleonui.

KM: Ohh. So the adze stones up there, was important to them?

JA: Yes.

KM: Did you go to the old adze quarries, *mauka*?

JA: Yes.

¹⁹ Mr. Ah San noted that Laupāhoehoe-Waipunalei Trail runs up the mountain from near the *heiau* of 'Umi—recorded as being named Māmala or Ha'akoa (Stokes and Dye 1991:157). He also mentioned that the trail runs *mauka* past Ke-ana-kolu (The-three-caves), which was a known resting spot on the trail up the mountain. The caves are approximately one mile *mauka* from the old Keanakolu ranch house (pers comm. October 2, 1998).

KM: You followed the trails, going *mauka*?

JA: [nods head, yes]

KM: You know, along the trail, when you walked on the trail going *mauka*, where there *'ahu* along the trail to mark it?

JA: Well, not until...the trail going up, the *'ahu* trail was built by the CC boys.

KM: Oh, so they made *ahu* along the trails?

JA: Yes.

KM: So before days, the people just knew where the trails were?

JA: Yes. That was by the CC and then, you see at that time, there was no road going up, so people didn't know about Mauna Kea. And this guy, Joe Hee, he worked for United Airlines, and somebody asked, "Who's skied Mauna Kea, the first?" And I went back and looked up the records, and it was Bryan, in 1935.

KM: Hmm, so he went skiing on the mountain?

JA: Yes. You see, he got here in 1921, when he got there, and then in 1936, the snow came way down, I think, almost to Humu'ula.

KM: Oh, it was a big snow year.

JA: Yes, big one. And then he got his skis, and Alfred Carter, gave him a horse, and they packed the skis and went up.

KM: Hmm. So, when you walked all this mountain like this, and you mentioned the old man loane...?

JA: Yes.

KM: And Willie Kaniho. Did you ever hear them talk any stories about Mauna Kea?

JA: Well they talk...you see, like Willie, way back, you know when 'Ikuā Purdy, the three cowboys?

KM: Yes, in 1908.

JA: Willie was only a young fella. He had that *pu'u waiū*²⁰, you know where Eben Low lost his hand?

HM: Ahh.

JA: That's where, at Keanakolu. When they catch the wild cow, he tied 'em up, and the rope caught in there and he lost his hand. Willie had the *pu'u waiū* in his memory. When I left there, the house, I think they burned the house, that Keanakolu Ranch House.

RO: Uh-hmm.

JA: Somebody burned 'um. I don't know whether the sheep station house... That was the first sheep station in Mauna Kea. [see Figures 6a & 6b]

KM: Which one?

JA: Keanakolu.

²⁰ *Pu'u waiū* – is a tying post set in the ground with a fork at the top, around which a rope was hitched when drawing in a wild steer. Once drawn in, the wild steer was secured on the post until it was worn out. Made of a dense native tree trunk. Mr. Ah San believes that this *pu'u waiū* is still in place, near the former Keanakolu Ranch House (additional interview documentation recorded on October 9th). Some of Eben Low's descendants have spoken to Mr. Ah San, and are interested in it's preservation (pers comm. October 2, 1998).

KM: Did the *pipi* and the sheep used to go way *mauka* too?
JA: No, fence.
KM: Hmm, so that's why you guys were putting the fence in then, to protect the plants?
JA: Yes.
KM: So Eben Low lost his hand...?
JA: Yes, at Keanakolu.
KM: I hear, that when he died in 1954...
JA: They put him up there.
KM: Yes, they took his ashes to the top of Mauna Kea²¹.
JA: They had his ashes way up there, and they had this plaque, but I heard that the University made them take that away.
KM: Not! For real?
JA: I think that's...you know, the plaque, it doesn't do nothing. And Eben Low, that's a history, you know.
KM: Yes.
JA: When you talk about 'Ikuā Purdy, Eben Low and the third guy.
KM: Archie Ka'au'a.
JA: Ka'au'a. You see, that's history.
KM: It is.
JA: Well you see, way back in those days, we don't know United States, and they go up there and bring back the championship.
KM: Yes. When you walked on the mountain, did you ever see any old shelters? Like sometimes, when the Hawaiians would go make adze like that, or when they traveled across the mountain? Did you ever see any shelters, like small house sites?
JA: No. You see, like Keanakolu, they only had that cave. And then up on Mauna Kea, they had a lot of caves up through there.
KM: For the adze makers?
JA: Yes.
KM: You saw some of those caves?
JA: Oh, quite a bit...!
KM: ...So did you go on the old Waimea-Humu'ula Trail?
JA: Well, the Saddle Road, that trail, that was their road. The lower land, no. You know, the moment you come from Ka'awali'i Gulch, you can't go. So Isabella Bird Trail, it's up in the forest.

²¹ On Oct. 1, 1998, I spoke with John Hansen, who with his late wife Violet, had been involved in archaeological-ethnographic work on Mauna Kea in the 1960s. During the conversation, Mr. Hansen mentioned that he'd heard Bill (Lester W.) Bryan's ashes were also taken to the summit of Mauna Kea. Meeting with Mr. Ah San again, he confirmed that Bryan had retired in the 1960s and lived in Kona, until died in 1984 (1895-1984). At Bryan's request, his ashes were taken to the top of Mauna Kea and scattered there. To the best of Mr. Ah San's recollection, the scattering of the ashes atop Mauna Kea was a private affair, and he was the only non-family member in attendance.

KM: So Isabella Bird, when she traveled around, about 1873, she rode horse like that?

JA: Yes...

KM: Now did you folks used to build any stone walls at all, or was it all fence line?

JA: All fence line.

KM: Okay... So you went all over the whole mountain?

JA: Well, I was lucky. You know when the Triple C boys, they never had a cook, and Bryan told me to "go cook." I told him, "I never did cook." And he said, "Oh, you were in the kitchen when you were small, when I came." I said, "I only waited on the table." And then there was a forest ranger in Ka'ū, Bridow, and he came over and helped. We were lining up the fence to build the fence line around Mauna Kea.

KM: So CCC made the fence. What about WPA?

JA: No. WPA, you never could do that. The way they treated the boys, today, we would all go to jail. They were treated like slaves. Hard work. And the boys were happy. And the worst part, we got boys from Honolulu, Kaka'ako, the gangsters. They came up and turned around to be nice boys. I know one, a big Hawaiian boy, and he came up. He was one of the Kaka'ako boys, when he went back, he made head trail boss. Take care of the boys. He went back, he left Kaka'ako. I went to Seattle, I seen him up Seattle, head man down at the wharf. A big guy.

KM: Wow. So the hard work, they turn around?

JA: Yes. But nowadays, you treat your... The guys go up there, and the boys going tell the parents, they all go jail. Five 'o clock in the morning, cold, roll call. We were up Keanakolu, got to save water. Take a little water in the cup, brush your teeth [chuckles]. Hardly any cup of water, wash your face and all.

KM: Hmm. So all of those cabins were all water catchment. No more springs anywhere?

JA: Only Kanakaleonui. And Kaluamakani get, but it's only a drop, a little.

KM: So before days, they made the cup in there and catch water?

JA: Yes. But Kanakaleonui, pretty good.

KM: Oh. So you like that place up there, Kanakaleonui.

JA: I tell Howard Horiuchi with DLNR, "You like the mountain... [chuckles], but you don't know where Kanakaleonui Spring." These guys, if the car can't go, they won't walk... [chuckling]

KM: [chuckling] ... Mr. Ah San, when did you retire from Forestry?

JA: [thinking] Around 1967.

KM: Did work on Mauna Kea all that time?

JA: Yes.

KM: So all that time?

JA: Well, I went up in 1933.

KM: Wow!

JA: That was depression, no work eh. So I had to... Roosevelt made some, money here, money there programs. They had \$2.00 a day, go up.

KM: You know, your picture here, with the silversword here, on the side of Kanakaleonui...

JA: Yes.

KM: Did you know Sunada?

JA: Yes, he was a good friend of mine.

KM: I spoke with his son Kaoru, and he said the papa used to take care of the silversword plants, yeah.

JA: Yes. Well, when the silverswords came up... There were no silverswords, then we found this one [pointing to the picture] in 1933. No more... Then that disappeared. Then we went down, Kahinahina, you know, where they had that house. Right above in the road. Boundary, you know Wailuku River?

KM: Yes, yes.

JA: Down there, right in there, I think it's the most.

KM: Had plenty?

JA: Yes. I read one time in the paper. They had that in the paper. But that's the worst thing they can do.

KM: Yes, 'cause then people go and take.

JA: Yes...

KM: When you went to the mountain, so in your recollection, you never saw any *heiau*, burial, or any thing up on top of Mauna Kea? Or something that you remember hearing about?

JA: No, no. There was one guy, Makaio, an old Hawaiian, Makaio. Like the *heiau*, he said that's where they take and they got to...where the chief take the good ones. And then what they don't want, goes back to the commoners. But I don't know of no heiaus up above. They were all down near the shore line, where they have people. It's where they have their produce, the fish, and the chief has his place.

KM: Hmm. So like this 'Umi's *heiau*...?

JA: It's like a market.

KM: This 'Umi *heiau*, you said, down here, that's what they would do, they would bring the food like that...?

JA: Yes, food. And then eh, they go in and say, this is a *heiau*, [shaking head] that's not... Well, you know, when I came back, and the things came up, all the old timers were gone. And I was out too, myself.

KM: Yes. Now, you're the old timer. So you knew Willie Kaniho, Ioane Haa them, yeah?

JA: Yes. Well, I was lucky, I never had no interest, but when I came back and I worked at Pōhakuloa and took people around, and that got me a lot of interest.

KM: Hmm.

JA: Like I told you, I told the school teacher [laughing], I put the ice. Well, I learned. So from there on, I don't tell stories. I want to learn facts, I want facts. And that helped plenty.

KM: Yes...

[Discussing roads and trails around Mauna Kea]

JA: ...I don't know if you heard, that Mānā Road, they wanted to have that for the Military and tourists. And I don't know, one of the guys from Waimea was here. I forgot his name. He was talking about what I thought about that. And I said, "Geez, if the military go take over, we damn lucky." You know, Parker Ranch has the gate there.

Well, the military take that over, put a 24 hour gate man, when you go there, you stop. Military again, Keanakolu Outpost. They get a nice cabin for stay, you know Humu'ula Sheep Station, another outpost there. What more you like? The boys going be happy.

KM: Yes. Thank you so much...

Johnny Ah San

Driving Interview of October 9, 1998

Humu'ula to Keanakolu Cabin

**with Kepā Maly; Rodney Oshiro and Pat Thiele (Na Ala Hele Program);
and Paula Cook (neighbor of John Ah San)**

The narratives below were recorded while driving *mauka* on the Saddle Road, and then along the Humu'ula-Keanakolu mountain road. The narratives cited in this study cover the Humu'ula to Keanakolu section of the interview.

KM: ...Was there a cabin before on Pu'u Ho'okomo?

JA: Yes, but I think they tore 'um down. I think the only cabin still going is Pu'u Lā'au.

KM: Hmm.

JA: They had every six miles, one cabin... [by Pu'u Huluhulu] This is the 1935 lava flow. And the CC Camp, they had the boys on twenty-four hours, rotation schedule. And then we had the camp down at Pōhakuloa.

KM: Did the CC Boys work with the visitors?

JA: They came down to help check the flow front, in case of fire.

KM: Ahh.

JA: And then I used to be around the mountain, but I was sent to Pōhakuloa. And that's how I stayed at Pōhakuloa for a while.

KM: Hmm.

JA: Now you can see Humu'ula Sheep Station.

KM: Yes.

JA: I give the Hawaiians credit, they name something and they get meaning for the names.

KM: Yes, plenty of the place names tell stories.

JA: Now, you are going to see the stone wall. That was built by the Chinese and the Germans.

KM: Haneberg them, when he ran Kalai'eha, Humu'ula Sheep Station?

JA: Yes. Alfred Carter had the diary about that, when the Germans and all, built that place. They had it down, what they did.

KM: Did you have a diary?

JA: No, Carter. He don't let nobody. He told Bryan, you can read 'um, but don't take 'um. I didn't see the diaries, Bryan told me about them.

KM: Hmm... [looking at HTS Plat No. 613] You know, if I may ask you, you know when you go around this side [north-west], Pu'u Lā'au?

JA: Yes.

KM: Do you know of a trail that went on top of the mountain from Pu'u Lā'au, that you remember?

JA: [thinking]

KM: This is the old Forestry map. Here's Pu'u Lā'au, and this is Makahālau, here. Did you ever travel on a trail and come up on top of the mountain from this side?

JA: No. I've been up around the fence side.

KM: Hmm, you walked that whole fence line all of the time, yeah?

JA: Yes, to make sure sheep don't come in, or no cattle go up. When the fence was built by the CC Boys, I think it's 80 miles around the mountain.

KM: Hmm, what a job.

JA: Oh, you've got to give those boys credit. [chuckles] if you put those boys now, go work, they sue the government. That's more slave work. But they liked it.

KM: They did a good job, yeah?

JA: Yes.

KM: This is so interesting, thank you... Now the old trail or cart road, was here by Kalai'eha, Humu'ula Sheep Station eh?

JA: Yes, it goes down through there [pointing to location crossing the present-day road]... [passing Humu'ula Sheep Station] Sam Parker's house is in the back there, and this Quonset huts, are all from the Army. This is the old building, that red one there, is the old one... This land is Hawaiian Homes, but Sam Parker had the lease and he had a house.

Sam Parker was a smart man, and I gave him credit, when he was doing all the business in Honolulu, he agreed to Alfred Carter, to sell everything to Richard Smarts' mother, Sam's sister. After thinking it over, he sold it.

KM: Was it pretty much like this, with just scattered *māmane* when you were young, or was there more?

JA: There was a lot more *māmane*. You can see all the dead stumps. Had a lot more.

KM: And was there *naio* up here too?

JA: Yes, all going over, used to be *naio* and they had some *koa*.

KM: Oh. Was there *pili* grass up here?

JA: No *pili* grass. *Pili* grass is Pōhakuloa.

KM: Oh. [driving along the Humu'ula-Keanakolu dirt road] This road here, that we are on, was this old trail or...?

JA: It was a trail, then the CC Boys made a car trail.

KM: So this was just before the war or in the war time?

JA: Before the war, 1935.

PC: And they planted potatoes on the side, you said.

JA: [chuckles] Well, on the other side, the Germans and the Norwegians put potatoes all along the road, the Irish potato.

KM: So *mauka* up here?

JA: Yes, on the road.

KM: Laumai'a side like that or right here?

JA: No, all along side the road. So when you come over, you...but those days, you plant, you put back. And then when you want potato, you don't have to worry. And get a lot of pigs, sheep, so meat no problem. The potato just grow wild, nice potatoes. All the way to Keanakolu. As a matter of fact, all the Mānā Road.

KM: So all the way around?

JA: Yes.

KM: So in the German's time, and Norwegians...?

JA: Yes.

KM: And still had when you were young?

JA: Yes, well when I came up, they still had. And I think there are still a few potatoes on the side. [chuckles]

KM: Still yet, maybe?

JA: Yes.

PT: When I first started in Forestry, I could still find potatoes up Doctor's Pit side.

JA: You know, they call this Huikau. You see that hill there, and these hills here?

KM: Yes.

JA: You stranger, you come [chuckles] you get lost in between here. I had to sleep one night. I came out here, and then I thought I would go back. When I came back, I lost the trail, and I was going around. I got to the gate on the other side, dark. I had to camp over night [chuckles].

Group: [chuckling]...

KM: Do you remember the USED, the Engineer Division?

JA: Yes.

KM: Did they do work on this road, or was it mostly the CCC?

JA: CCC. USED worked on the lower road [Hilo-Kaūmana side].

KM: So CCC fixed this road for cars?

JA: Yes. That's all man power too, with a pick and shovel. No more four wheel trucks. Man power [chuckling]... You see, when you come with a horse, you get over here, over there, you don't know where the trail, and you go in between here, and you can get lost.

KM: Huikau.

JA: Who keeps up this road?

RO: The County.

PT: At least as far as Nobriga's lease.

JA: Oshiro, who took away the old antique grader and trailer that they had for haul water?

RO: I don't know.

PT: Yes, it disappeared a couple of years ago. I don't know who took

JA: You seen that eh?

PT: Yes. Was that a Parker Ranch thing, or was that CCC?

JA: CC time. The trailer, that was when they haul water from Pōhakuloa. And the boys, when they built this trail, make car road, they sleep in tents, and they haul the water out. And then [chuckles], the small little tractor. And funny, the guy came get the water, and he hauled water all the time, and he got over here, go down the road, and I think he was too sure. Throw 'em into high gear, the tractor turn over. Good thing he didn't get hurt.

KM: Yes. The cinder here is so beautiful too, dark, black.

JA: Yes. Before, here [Pu'u Loaloa], used to have good sweet potatoes.

KM: It's amazing to see how on the side of the *pu'u*, where the *pipi* can't get to, you see *kūkae nēnē*, *māmane*, *'ōhi'a*, *pilo*, like that. The trees are still living.

JA: Yes. One time, when they were digging for water for Pu'u 'Ō'ō, they found an *'ōhi'a* tree buried. Bryan cut slabs and he sent to different places to identify and find out how old. And one place came back so many thousand years old.

KM: It had been buried under all the cinder or ash?

JA: Yes, I think when Pu'u 'Ō'ō hill came up. No forget, I'll show you the letter Bryan got.

KM: Gee!

JA: Now this is a good view of Pu'u 'Ō'ō Ranch.

KM: Oh, so we just came around Pu'u Loaloa...

JA: When did you folks put the sign Pu'u 'Ō'ō Trail?

RO: A while ago.

JA: That's nice. You know, a long time, people look at that, they don't know. You ought to find that Morita Trail, and put one sign up. Well put something about it – that's the old trail that they had when they were building the fence for Pu'u 'Ō'ō.

RO: We want to find the *mauka* trail, Pu'u 'Ō'ō trail this side of the Saddle Road, and the one that hits this road over here.

JA: Well, you know where you get that trail from over there, it comes over, but it's down below.

KM: Below the Pu'u 'Ō'ō ranch house?

JA: Yes.

KM: That's what Toshi Imoto thought also.

JA: You see, at that time, there was no Pu'u 'Ō'ō Ranch, it was only Pua 'Ākala.

KM: Ah, Hitchcock them.

JA: Yes.

JA: [discussing Hawaiian Home Lands] ...Pu'u 'Ō'ō Ranch and Parker Ranch, get a place that goes in and then down, and that's Hawaiian Homes.

KM: Yes, Humu'ula...

JA: The father used to like working up here.

KM: Yes. When you were telling me about Eben Low, Ikuā Purdy, and Willie Kaniho...

JA: Yes.

KM: Keanakolu was Willie's first place, and he loved all this mountain side.

JA: Yes. [looking down to the forest line in the vicinity of Pu'u 'Ō'ō] That forest down there, Bryan make me every month, you know, I had to walk the line every month. But, you can't do it. He like you do so much. Whet the hell you can do [chuckles]?

Group: [chuckling]

PT: [stops along side road on the west side of Pu'u 'Ō'ō]

KM: You know the trail from Pu'u 'Ō'ō that came *mauka*, to go around the mountain-side, do you remember where that trail was?

JA: Yes, down below.

KM: Okay, you try tell us where to stop, if you see the area.

JA: Well, this is Pu'u 'Ō'ō, and you go on farther when you get to Pua 'Ākala, you go down, and then when we get to Hopuwai, you get back on the old trail

[The upper road that is presently cared for by the County, is a more recent alignment – the trail was made to provide Parker Ranch with access through it's lease lands, and then made into the car road in ca. 1935. The lower trail through Pu'u 'Ō'ō Ranch and to Hopuwai, was the older trail, a part of what is sometimes referred to as the Laumai'a Mountain Road. (summarized from information discussed later by Mr. Ah San)]

JA: The old Hawaiian trail is way far down.

Group: [driving]

KM: So this is the newer road that CCC worked on?

JA: This was when Parker Ranch took over.

KM: So this was their *mauka* trail?

JA: Yes.

KM: So the earlier trail that goes to Laumai'a like that, is below?

JA: Yes.

KM: So the old Laumai'a Road was older, from Hitchcock them's time, around 1860s or so.

JA: Yes.

KM: So this forest, the *māmane* has thinned out since when you started working up here?

JA: Yes. You can see a lot of the dead wood, a lot of the trees are gone.

KM: Yes. Do you think this is from the sheep mostly, or the *pipi* too?

JA: Well, I think the sheep, the *pipi* not too bad. They had 29,000 sheep at one time.

KM: Wow!

JA: And you figure 29,000 in forty-five, or say fifty thousand acres, plus horses and cattle.

KM: Yes. Oh, here's a waterhole below us ...

JA: There's one down there that Willie built, he haul water for the *pipi*.

KM: Oh [pointing to the upper side of the road], look there is a part of a stone alignment on the road side, it looks like it may be part of the old road.

JA: Yes, when they cut it out.

KM: So this section that we are on is newer than that road section?

JA: Yes. [looking out to the Hilo Forest Reserve] You see where the cloud is down there?

KM: Yes.

JA: That's where the *nēnē*...they come and every morning. They would fly up to Pōhakuloa side. That's why they call one hill there, Pu'u Nēnē. They fly there and they go to Mauna Loa.

KM: So that hill is *Nēnē* hill?

JA: Yes, that's the old Hawaiian name.

KM: Yes. And from by the edge of the forest, they fly *mauka*?

JA: Yes, in the morning they're down there.

KM: So before days, probably had *nēnē*?

JA: Oh yeah.

KM: But when you were young, the *nēnē* were almost gone eh?

JA: Well, they still had 'um, like Mauna Loa... [chuckles] Like I said, when I went over to CC Camp above Kahuku side, I didn't know what it was, and I shot one *nēnē*.

KM: [chuckles] You said Martinsen told you something?

JA: I told him, "I shot a duck." He told me, "You shot a *nēnē*, you go to jail."

KM: And you said was 'ono eh?

JA: 'Ono! Nice and fat!

Group: [laughing]

JA: But I had already killed it.

KM: Yes, you never know. You said that was the first time you saw a *nēnē*, yeah?

JA: Yes. Martinsen was nice, and he told me, "Don't throw it away, you *pohō*." So, I took that, burned all the feathers, cook 'um up. Duck!

KM: Who ate that *nēnē* with you?

JA: The foreman, Martinsen and a few of the boys. Was nice, like one turkey.

KM: Ohh!

JA: I never tell anybody till now [chuckles].

KM: That's okay, the evidence is gone [chuckles].

Group: [laughing]

JA: They can put me in jail, free *kaukau* [laughing]. That's more like going to day care.

KM: Yes.

JA: [pointing] That's where the Pu'u 'Ō'ō house is, right down there.

KM: Ah, so there's the reservoir, and this hill here, is Pu'u 'Ō'ō?

JA: Yes. You can see the line goes down, that's where the Pu'u 'Ō'ō houses, there's a new building there, the old ranch house is back of one other *pu'u*.

KM: On top of that *pu'u*, with the line of *sugi* pines, that's where Imoto's family and Ochi family...?

JA: Yes.

KM: ...were buried.

JA: Yes.

KM: But they took their graves out of there already.

JA: That's Pu'u 'Ō'ō Hill [pointing to distance in front of us]. And this is all gorse now, before, had *koa*.

KM: Now, it's all gone.

JA: Yes.

KM: So in between Pu'u Loaloa and Pu'u 'Ō'ō, had *koa*. Oh, there's a little bit growing down there, there's a small cluster of *koa*.

JA: Yes. You see the pine tree in the hollow there, that's where that attorney, Carlsmith has a place now.

KM: Hmm... [passing a fence line with a cattle guard] Did you folks have these cattle guards set in before?

JA: No, only gate...wait a minute now, the later part, CC, when they had the bulldozer, then they built a cattle guard...
 You know, Willie Kaniho, he's a man...when he drives cattle, he's a son-of-a-gun. No matter who, any little mistake, he call you all kinds of names. And when it's *pau*, there's no trouble. When driving, he was serious. And then when all *pau*, he get his different sections, the men take care, he'd give orders to the foreman, he don't bother you. If he sees something wrong, he talk to the foreman. And then, if the guys don't do what he wants, he just tell, "If they don't do it, fire 'em!" Just like that.

KM: That's how he got the work done eh, just like Bryan.

JA: Ohh, I think he was a little worse than Bryan [chuckling]. But, the moment...had a cattle drive, he gave the foremen orders, anything go wrong, he doesn't jump on the men, he talk to the foremen.

KM: Hmm. Oh, sad, look at Pu'u 'Ō'ō, all covered with gorse.

JA: Yes. The gorse before, had only one, right above here.

KM: So just above Pu'u 'Ō'ō?

JA: Yes. They had that, then they had a caterpillar and they poison, and then they had another one at Kahinahina. Then when the [chuckles] caterpillar went over, it spread the seeds all on the road. Willie had cowboys dig, dig, but they couldn't find all. And after Willie left, the other young guys, to hell with that!

KM: So they didn't take care?

JA: But now, if they would continue a little at a time, they would get the gorse. They hold 'um back...
 [Throughout the day, Mr. Ah San lamented on the extent of the gorse coverage on the mountain slope. He observed, that from the looks of it, the present work on the gorse appeared to be random, with work started in one place, stopped, then work done someplace else (spot poisoning in some areas). He suggested that a tractor puller, taking one plant at a time, and burning the pulled plants, would be a way to start. Eventually there would be gorse free areas, which could be extended.]
 ...This road, they were building for a car trail with the CC Boys. They sleep outside in the tent, and water was brought in the container. They took off the grader and the trailer had a water tank. They should leave that on the side, an old antique.
 [pointing below] Now you can see Carlsmith's place, clear.

KM: Yes, beautiful.

PT: Let's stop here, this is probably about the best view we'll get.

KM: Okay. [looking out of the car to the *makai* lands] You know, we were talking about the trail from Pu'u 'Ō'ō and around that side towards Keanakolu.

JA: Yes.

KM: And you said, it's not up here?

JA: No, no, it's down.

KM: So the old Laumai'a trail...?

JA: Down by the Pua 'Ākala house.

KM: So it connected from the ranch hose and went around?

PT: Can we see it from here?

JA: A little further over, you can go down, and you can see just about where.

KM/JA: [looking at Register Map 1718 – getting bearing on trails, and ranch facilities] What Pat and Rodney are trying to find is where this trail intersects with the road.

JA: Here's Pu'u 'Ō'ō. Go up and catch with...this is Pua 'Ākala.

KM: Yes, it goes to Pua 'Ākala, and here's Laumai'a house.

JA: Yes...

Group: [gets out of the van standing on bluff overlooking Pu'u 'Ō'ō ranch lands vicinity — reviewing maps and landscape to identify the *mauka* alignment of the Pu'u 'Ō'ō Trail.]

PT: So that's Carlsmith's place now, right?

KM: Yes.

PT: And this trail [pointing to a trail, visible on the ground], looks like that one that you were just showing me on the map.

JA: Yes, right there. See back of...about the end of the trail, goes down right there.

KM: Yes, that's what it looks like, from Baldwin's 1891 map, and from this map [HTS Plat 613] here, that's what this looks like.

PT: Yes, that's what I'm thinking.

KM: So we should be able to see where it comes up and intersects the car road a little further down, not too far from where we are now?

PT: Yes. If we are on the same alignment now, as this map shows this trail.

KM: It's very close, because you look at how close we passed Pu'u 'Ō'ō, we were right at the base.

PT: Yes, we were right there.

JA: Yes.

PT: So we are talking now, that this is probably Laumai'a, this one here, the lower one?

KM: There are two trails, yeah, up here, this *mauka* one here...?

JA: That's the old Hawaiian trail. That's the one that goes to Mauna Kea and goes up to Lake Waiau.

KM: Oh.

JA: And then when we get to the caves, Keanakolu, then that's the trail that they used to use, the old Hawaiian trail from Mauna Kea, go to Laupāhoehoe.

KM: And your Waipunalei Trail?

JA: Yes.

KM: I have a map for you of Waipunalei, from 1875 (Register Map 667), it shows a part of the Waipunalei-Laupāhoehoe Trail.

JA: You know, all the maps, when it comes to the ranches, they stopped, they don't want to show the people where the trails go. But like the trail from Laupāhoehoe, the old 'Umi trail, that's Waipunalei side.

KM: Yes. [pointing to location on map] So this is your trail coming up from Waipunalei, 'Umi Trail?

JA: Yes.

KM: It came up to Keanakolu [the cave site, not the present-day cabin site].

JA: See, the trail from Waipunalei, on the Hāmākua side of Laupāhoehoe, there is a 'Umi *Heiau*, and they go Waipunalei and come up. That, when the plantation and the ranches came in, covered. So out of the forest, we don't know. They asked, but I don't know. The trail comes. When we were working, Bryan says "Outside of the forest, that's the County, we get nothing to do."

KM: So they bulldozed to clear that land, so you lost the trail alignment.

JA: Yes.

KM: Okay, maybe we can go down a little further now and try to find where this trail comes out on the road.

JA: The trail is down there.

KM: Doesn't it come up?

JA: Yes, right down here, there is another trail that you cut down, and then this trail goes over. I think it's right over this little rise here [to the northeast of where we were standing].

KM: Okay, we'll go...

Group: [back into car]

JA: You know, at Pua 'Ākala house, they had a door that had a picture drawn, with the *pua 'ākala*. They said they took the door, the family took the door.

KM: Yes, I saw the door. Roy Blackshear has it. When they sold the lease, they took the door. It was a Hitchcock painting.

JA: Yes, yes.

KM: So the door, a beautiful *koa* door...

JA: Yes.

KM: ...and has the 'ākala berry and flower...

JA: Yes, on top.

KM: Blackshear has the door at the *makai* house, Kea'au. So at least it has been preserved. You know, why, the guys, when they sold the lease, guys started stealing everything from the house. So Roy was afraid they would take the old door and burn it or something.

JA: That's the young Blackshear?

KM: Yes. Roy, Herbert's nephew.

JA: Yes.

KM: And Hitchcock signed the painting.

JA: When you can get in touch with Roy, I would like to go down and see that.

KM: Oh, I'll call them and make arrangements.

JA: Paula, you got to see that door.

PC: Yes.

KM: I'll talk to him and make arrangements. Then we'll go down to Kea'au. And you said, that you only went down one time, yeah, to get *nēnē*?

JA: Yes, once.

KM: You know, you mentioned one guy, who worked at Pōhakuloa, taking care of the *nēnē*, Yealing?

JA: Yealing, from England.

KM: Do you know how to spell his name?

JA: I really don't know. He worked for that trust in England.

KM: Yes, the Wild Fowl Trust in England.

JA: Yes. And then I think after he came there, and then Wildlife took over. I forget, about ten years or so later. And then when they had that, put 'um in incubator like that, he said, that's not wildlife.

KM: Yes, that's what you said, you've got to keep them out in the wild.

JA: Yes, keep them, get out, and then little by little, they go far. This one here, you see in the paper, the car run over the *nēnē*. The car don't run over, they run to the car.

KM: Yes, that's what Roy Blackshear was saying too. The *nēnē* are tame and run right up.

JA: You got to give Shipman credit. And you know, the old man Shipman and Bryan, were good friends, then tomorrow, they were that way. [gestures throwing blows – chuckles]

KM: So they go back and forth?

JA: Yes. Like one time [chuckles], Shipman and Bryan disagreed. And Shipman came up to Pua 'Ākala, and it just happened that I came over and checked the fence and I see Pua 'Ākala. When I got over there, Shipman was angry as ever. I get down there, the dogs bark, Shipman came out "Get out of here!" I got on the horse to go to Laumai'a, had a house. But then he changed his mind, he called me to go back there [laughing]. The two guys, the same, Shipman and Bryan.

KM: Yes.

JA: But I got along with Herbert real nice...
[looking out at all the gorse] You know, in some way, if it wasn't for this gorse, Hilo would have been pretty bad. The gorse, they had the dry, but it holds the water. So there's good and there's bad.

KM: That's right. But before days, this was all forest, right?

JA: No, had all the sheep and cattle.

KM: Yes, but before they were brought in?

JA: Yes.

KM: So the watershed was good, the moisture would always come.

JA: Well, the Germans came they brought in the sheep and what.

KM: Even Pua 'Ākala, Hitchcock them used to come up hunt the wild *pipi* too?

JA: Yes... Fujitomo was one of the guys who took care over here. He's still around?

RO: Yes...

JA: [pointing to section along road] Now, this is Laumai'a here.

PT: Where is Hopuwai?

JA: About six miles more.

PT: So this is Laumai'a?

JA: And on the other side is Wailuku River.

KM: [crossing a small dry, stone stream bed] So this is one of the feeders to Wailuku?

JA: Yes, and the main Wailuku is over there [pointing in front of us]...
[speaking of 'āhinahina (silverswords) that once grew upland of the stream beds, above the road] ...I came up, had several more, from then on, I never see. Had about twenty or thirty nice, good size.

RO: Still get, I think.

JA: It's right on the boundary, you can't miss 'um. And I don't know how the road for Kahinahina is, the mountain road, *pau*?

RO: No, good.

JA: From there can see.

PC: The silverswords were up from here?

JA: Yes, in the forest. Oh, this is the main Wailuku River. [pointing to dry stream bed we were crossing]

RO: Hey, we should put a sign up.

KM: Yes.

RO: Headwaters of the Wailuku River...

KM: ...So if you follow Wailuku river, you go up, you'll come to the 'āhinahina?

JA: You follow that, right there.

KM: And this *pu'u* [pointing upland], 'A'ahuwela, you remember that *pu'u*?

JA: Yes.

KM: And then you said you go further up to Pu'u Kahinahina?

JA: Yes, you go up. Actually, they blame the sheep for no more silversword. But the two legged ones take 'um out... [crossing the third small stream bed]. This feeds into Wailuku also. I forget, it's a branch of Wailuku.

KM: Yes...

JA: [describes road making work by CCC] They took the cinder here and laid it out on top of the road, and a few places, they bring rock in and build up the road. Then after them, they had the Wildlife guys, they did a good job. Then Shipman had their graders and all

come up... There is Pua 'Ākala [pointing to an area about half a mile in front of us, on the *makai* side of the road].

KM: So where all those pine trees are?

JA: Yes... This is the trail that goes down to Pua 'Ākala. You have to go down, quite far. Before, I walk all this area, I walk the fence line all along Honohina and around. Can't take a horse, too thick, the forest.

KM: So Hakalau to Honohina, because the forest is so thick?

JA: Yes, you got to check the fence line. C. Brewer gave the land for the forest. In other words, we had no business, but since it was given to watershed, Bryan wanted us to upkeep. But was waste time [chuckles], had all the wild cows in there, hoo! And then, when the war came up, there was no labor for almost five years.

I was talking with Degner, and he told me that sometime in the early 1920s, he and Bryan went up to Mauna Kea. Then Bryan took him to Keanakolu. When they got to Maulua, Bryan asked him "What kind of flow is this?" And he looked at it, and said "That's interesting." The next day, they had to come back and check it out. Degner said, "This is a glacier." He told Bryan, "See how far this goes down." Well, that was that. For a long time, Bryan had so much to do, he couldn't go. Then when the CC came up, he had to take care of the whole Territory so he never had a chance. Then the war broke out, then after the war, he put me over at Pōhakuloa, and within three years, he brought me to Keanakolu. And he told me, "You know, when you get time, check how far this goes down." So I had to check. It's more like a bulldozer made a mound. About in the middle of that, Maulua and Laupāhoehoe, had that thing. Then I came to a place that had an opening—I forget the river name now—it goes down to Pāpa'aloa. And when the river comes down like that, it looks like it's going up hill [chuckles]. It looks more like a devil hill [chuckles], I thought I was seeing things.

KM: Hmm. So the glacier pushed all the stone debris down?

JA: Yes... When I used to check the fence, no [chuckles], and if I no check the water, I get good scoldings.

KM: So Bryan wanted you to record everything?

JA: Yes.

KM: We're going to look by-and-by, to see if we can find your journals, in the DLNR Storage.

JA: Yes...

PC: That would be neat...

JA: We used to bring people around the Mānā Road, right over that hill, you stop and show them, you can see practically all of Hilo and Hāmākua.

KM: Ah, so this hill below Kanakaleonui?

JA: Yes.

KM: So this is Hopuwai?

JA: Yes. Hopuwai is one of the coldest places on the mountain. Willie Kaniho said, all his life, he worked cowboy, he never felt so cold as there.

KM: Oh!

PT: It's at Hopuwai that trails come together on the map, yeah?

KM: [looking at HTS Plat 613] Here, see how this trail, the lower one, and then the *mauka* one come together at Hopuwai?

JA: Good thing you talk about that. You know the old Hawaiian trail, at Hopuwai, the trail is down below. You see where the trees are there [pointing to location]?

Group: Yes.

JA: You go in, and right below here used to be Shipman's, they call it Honohina. And then the old Hawaiian trail is below. When we get on the other side of the *pu'u*, Nauhi Gulch.

KM: Yes. You can see Nauhi Camp right on the map here.

JA: Yes.

KM: So Pihā, and the trail comes *mauka*?

JA: Yes, they go up. [pointing to trails on the map] The Hawaiian trail is the lower one. When Parker Ranch had, and they divided, this [the road we are on] is the Parker Ranch road, and then when the CC came they built the wagon road in Parker Ranch road. And that's how the trail came up this high. The other Hawaiian trail is down below.

KM: So below [pointing to lower trail on map], was the older Laumai'a Trail?

JA: Yes. And then Nauhi Gulch, and HSPA [Hawaii Sugar Planter's Assc.] built the house down below, Nauhi.

KM: Yes.

JA: And then HSPA had a man down at Nauhi Nursery, and they planted trees. Then before the war, Roosevelt had the WPA [Works Progress Administration], so the men planted trees in the forest.

PT: Did the CCC guys plant trees in the forest too?

JA: They did, WPA, CC...CC planted a hell of a lot... That time, the boys all sleep in tents...

KM: ...Okay, we've just gone through the first Hopuwai gate [driving around a small *pu'u*]. Now the old trail, you can show us where it comes out?

JA: Yes, just drive there [pointing further down the road], and we're going on the Hawaiian trail.

KM: Okay, so they join together?

JA: Yes.

KM: Okay, the second gate off of Hopuwai, the trails come together?

JA: Yes.

KM: So this is the old trail that comes off of the *pu'u* here [on the *makai* side of the road]?

JA: Yes, and now this is the old Hawaiian trail. Then it comes and goes right back of here. It takes about another 50 yards around, and they get the old Hawaiian trail. This one we came up to here, is not.

PT: So this is Pihā?

KM: We should be close to it's boundary. [pointing to locations on HTS Plat 613] Here's where we are, we just came around the little *pu'u*...

JA: Yes.

KM: And the trail joins the road.

JA: Yes.

KM: And now we enter Pihā, right here?

JA: Yes, Pihā.

KM: Nauhi comes down. So the *mauka* road is the Parker Ranch and CC road?

JA: Yes.

KM: And the *makai* road is the old Laumai'a Trail?

JA: Yes. Now, when we cross this gulch, we are going to hit... According to Dr. Degner, he thinks it was the glacier that washed down here and you can see the rocks. It ends in the middle of the forest.

KM: Hmm...

Shares a story he heard of why trail was called 'Umikoa:

JA: ...Right here, look down, that's Doctor's Pit, right there. 'Umi's trail is over on the other side [north] of here... 'Umi cut a lot of *koa*, but the *koa* is in Pu'u Loa [a land area in the *ahupua'a* of Ka'ohe], and that's how, when they built the ranch, Horner turned around and said 'Umikoa. Because on the other side, 'Umi cut his *koa* for canoes, at Pu'u Loa.

KM: So we're sitting now at Kalua Kauka, Douglas Pit, yeah?

JA: Yes.

KM: The 'Umi Trail here, runs up?

JA: Yes, on the other [north] side.

KM: Sort of the bundary between Laupāhoehoe and Waipunalei?

JA: The boundary between Laupāhoehoe and Waipunalei is right here, the trail is just on the other side. That's where we'll go up.

KM: So you were told that that was 'Umi's Trail?

JA: Yes.

KM: And they'd go *mauka*. Now 'Umikoa Trail was named because...?

JA: No, 'Umikoa Village was named on the account that 'Umi cut *koa* on Pu'u Loa. You know, a lot of these guys, got these names twisted. And then like people, they said they had "ten *koa* trees at 'Umi-koa" [a play on the words 'Umi-koa"], but 'Umi cut the *koa* over at Pu'u Loa.

KM: So where they call 'Umikoa Ranch now...?

JA: No, it's not. It was a little further this side [Laupāhoehoe side of the ranch]. But you know, when Horner came up built his ranch over there, then they got 'Umikoa, so they put it 'Umikoa. But what I got, this is all hear-say. What I heard.

KM: Yes.

JA: But it makes sense.

KM: Yes.

PT: [At Mr. Ah San's instructions, Pat turned *mauka*, off of the road, and followed a grass covered jeep trail upland, about 1/3 mile.]

JA: This is the trail that goes up to a corral, up here.

KM: So this road isn't the old trail then?

JA: No, no. The old trail is on the other side of the caves...

KM: So this stone corral, this is the one you were talking about?

JA: Yes, all stone wall.

KM: Who built that?

JA: Well, nobody has a record. But somebody thinks the Russians made it. Then other guys think it was the German guy,

KM: So how did you hear about the Russians coming up here?

JA: Bryan.

KM: And he said they made a settlement or something up here?

JA: Well, they tried to build something. That's why they have stone walls and little shacks like up here. But nobody knows who put this. The Russians or what... [pointing out the remains of a four-side stone wall enclosure] It's all gone now, the building. And there is the stone corral up there.

KM: So we're just a short distance away from the three caves?

JA: Yes, just down the slope [to the north].

KM: And we're here by the stone corral and the old stone house? [see photo below]

JA: Yes, the corral. And the house, nobody knew. A shack, nobody knew what it was. Then there are more stone walls, like Robinson Crusoe shelter. Maybe the people built that so the pigs don't get in. But no more door, so how did the people get in and out? The four corners are all closed.



***The Historic Keanakolu Corral and Forest Remnants
View towards Pu'u Kanakaleonui (Photo No. KPA-N694)***

KM: Oh wow! So we'll go look at that.

JA: [pointing towards the gulch] You go down there, you see where the tall trees are?

KM: Yes.

JA: Just about in that corner there.

KM: Okay.

Because it was raining, Mr. Ah San stayed in the car and did not walk with us in the field. Rodney, Pat, Paula, and I walked through the field, saw the stone structures Mr. Ah San mentioned, and found the three caves which are the source of the name Ke-ana-kolu (see photo, below).



View of the Opening to Two of the Famed Ke-ana-kolu (The-three-caves), Which gave Their Name to this Locality Above the Laupāhoehoe-Humu'ula Boundary Line. Two of the Cave Openings are seen in the Center of the Photo, in the Koa and Pilo growth. (Photo KPA-N1003)

Group: [back in the car, driving towards the Keanakolu Cabin]

JA: [observing the poor condition of the paddocks and pastures, Mr. Ah San commented] ...Willie Kaniho didn't like that. Nobriga bulldoze like that, he'd kick him out. He doesn't want stones like that, the pastures got to be clean...

[recalls hearing that a couple years after A.W. Carter took over Parker Ranch, the cowboys left for a while] ...Ikuā Purdy, Archie Ka'au'a, and Willie them.

KM: So that's what you heard, that it was because Ikuā wanted to do rodeo, and Carter didn't want to?

JA: Ikuā wanted to. And Willie had just left school, he was at Kūka'iau Ranch. Then Willie when he went there, he didn't like Kaua'i, so he came back. Then when he came back, Alfred Carter was having problems with the water up here. The guy that was running the ranch here, for Parker Ranch, he fired some guys, and then he told Willie, "You take over." Willie told him, "I don't know if I can." Carter told him, "You can take orders?" Willie said "Yes." Carter said, "You take over." So Willie started. But he did a good job.

Did you hear about Willie Meyer them, the "moonlight cowboys?" They had, Maulua, Meyers had all the Laupāhoehoe forest, Pihā Forest, they had cattle. Even Waipunalei. Parker Ranch, they had that. Just take over, no control. Then Willie Meyer got going over to Shipman Ranch. Old man loane caught him, with the cowboys, but they put all the blame on old man loane.

KM: Oh. You know Albert Haa, loane's great grandson?

JA: Yes.

KM: The family is really upset, because someone now is writing a story and they have a picture of their *kūkū* loane, titled "Hawaiian poacher..."

JA: loane was no poacher²². He go out and make *kahuna*. loane was the same age with my father. And my father, when he came from China, he landed at 'Ō'ōkala where loane was. He knew loane as a boy.

KM: Oh. About what year was your papa born?

JA: [thinking] I don't know. He died at the age of 93.

KM: Ohh! About what year did your papa pass away?

JA: I think it was 1967.

KM: Wow! So that was around the year that you retired?

JA: Yes.

KM: So papa was born around 1874.

JA: Yes.

KM: So you knew loane. And what happened, someone else was out poaching?

JA: Well, Willie Meyer, the older brother, Cawley Meyer, he was taking care of the father, they had a butcher shop. And they would drive the cattle from Humu'ula, go down on that Waipunalei Trail. And they used the log cabin there. Those olden days, they never take care. And that older Meyer, he just take anything. But loane was working for Shipman at that time.

KM: Yes. 'Cause loane and the boys, were long-time Shipman employees.

JA: Yes. This place here, is Jack Paddock. They call 'um that because this is where they breed the mules, and sold 'um to the plantation.

KM: What land are we in?

JA: This is Humu'ula, it goes here, far down, and Ka'ula Gulch is right next to here.

KM: Oh, so we're coming up to Ka'ula Gulch?

JA: Yes. Oshiro, you get your keys [for Keanakolu Cabin]?

RO: Right here.

JA: Bryan always had three things, watch, keys, and pocket knife. One time he asked to use my pocket knife, no more pocket knife. So Christmas, he always gave us something, so one year, he gave us Boy Scout knives. All the employees got a Boy Scout knife.

KM: Oh, nice...

PT: [pulls into the Keanakolu Cabin yard]

KM: ...So you were up at this cabin for eighteen years?

JA: Eighteen years. That was supposed to be my house.

PT: The small house?

JA: But of all the facilities down here, I'd rather stay down here in the kitchen.

²² For further information on loane Haa, see also, the interview with Albert Kahiwhiwaokalani Haa, Sr.

PC: He had a small side room that he made into his bedroom.

JA: Then when Bryan came, he'd sleep above. And then they called that "Bryan's Cottage."

KM: Had the foreman's cottage, the bunkhouse, and the kitchen?

Group: [inside the kitchen – mess hall]

PT: The guy ran the CCC, was he an army guy?

JA: Well, had different people. Had Manuel Adrian, one Hawaiian, I forget his name... [thinking] Kapena from Waimea. You ask anybody in Waimea, they know Kapena, tell them the baseball player. And Victorino.

The CC started in 1935, and then I was the first fellow cooking for CC Camp. Then they had about 30 boys sleeping up at that bunkhouse, but was supposed to have about 50 guys in there...

PT: And the CCC ended when?

JA: CC ended just before the war, 1940. The CC moved over...they had to get out of Waimea. Waimea was where the headquarters was, you know where the Hawaiian Homes office is today?

PT: Yes.

JA: You can see the stable there, that was the CC Stable...

PT: Oh.

JA: And you know, during the war, had blackouts. Here, the guy blackout all the windows, but he forgot the skylights [chuckles].

Group: [laughing]...

JA: [thinking] You know, that son-of-a-gun, Bryan. I can't forget, I was way over Pu'u 'Ō'ō, I'd checked Mauna Kea, and I say, 'hey, I get good horse, can walk fast.' I made it home here, about eight o'clock. Next morning I get up, saddled my horse, hey! My body all sore, I go sleep a little while more. Son-of-a-gun, every time you humbug, he's there.

Group: [laughing]

JA: He came, I was fast asleep in bed. But I had my working clothes on, horse saddled. But he was nice. He came up, "What's wrong?" I said, "Nothing wrong, I tired." You sick? I take you home." I'm not sick. I went up check Mauna Kea, and from Kole, I thought I can make home..." And you know what the son-of-a-gun tell me? "You can kill yourself, but don't kill the horse" [laughing].

Group: [laughing]

JA: He always has some remark.

KM: You know, when you went up to the top of Mauna Kea, did you hike from this side, the trail that goes up...?

JA: Humu'ula.

KM: The Humu'ula side. So there's a road now, is that sort of the old trail?

JA: No, the old trail is on your left. You know where they have the eating place?

RO: The picnic area.

JA: The end of that place, there is the trail that goes up. The CC boys built stone piles to mark the road. And that wasn't enough, they still get lost. So we had to put iron poles, paint 'um...I think it was orange, so that they can see.

KM: So the CC Boys built *ahu*, go all the way up to the top?

JA: Yes, all the way.

KM: Did you go to the top of Mauna Kea?

JA: Yes, plenty times... [chuckles] ²³That Bryan, was a son-of-a-gun, he always came up over the hill just when we were taking a break. A little while after World War II, around 1947, Duke Kawai and a group of us guys wanted to listen to the World Series. So we packed a radio up to the top peak on Mauna Kea, and took one of the iron pipes that we'd been using to mark the trail to the summit and put it in the *ahu* (pile of stones) that was at the top. We hooked up the radio and were laying back listening to the game. And who comes up over the hill? Bryan! He looked at all of us, and then called me. I had to go hike with him to check out different sites on the summit plateau. The other guys got to stay up there and listen to the game [laughing]...

Group: [back in the car going to look at the old Keanakolu Ranch site]

JA: ...This is the *koa* log cabin from Parker Ranch. And the old ranch house was up there [pointing to location about 400 yards south of the *koa* cabin]. And the *pu'u waiū* was right by there. These old pine trees here are about 100 years old, from the German guys time, and the old ranch house was right up there. Right on top of that hill, the flat area by the eucalyptus trees.

KM: Yes, you can see what looks like an old foundation.

JA: And right back, they had a sheep station, and the *pu'u waiū* is right back there... And the fruit orchard here, was planted by the German, and that's how Bryan had the idea for start one.

KM: Oh...

Group: [on the road, returning to Saddle Road]

JA: [describes how they fixed the road in CC time] ...In some places, they level off the ground or fill area. So they take the stones from the gulch, Ka'ula, and they take stones from in the pasture.

KM: So this part of the road, is the old one from before, and they just fixed it up?

JA: Yes, they followed the horse trail. And certain places they cut. You know, so they could make it easier for the car.

KM: Okay. So you guys laid stone out?

JA: Yes, like here [the section of road we were on], the mud. They go out and pick stones in the pasture and down in the gulch, it was all hand work. Then they fill in with cinder.

KM: Hmm. ... So here we are again at Hopuwai.

JA: Yes, Hopuwai.

KM: So the old trail goes down and connects to Shipman's?

JA: [There are two trails on the north side of the *pu'u*] The lower one is the old trail. This one goes over the *pu'u* to the house, this is the car road, a short one that goes to the house.

KM: Okay... Has the weather changed up here since you were young?

JA: Yes, plenty change.

²³ This narrative was added to the interview by Mr. Ah San during the review and release of interview records meeting of October 31st. I asked him about the World Series-Radio story mentioned by Pete L'Orange (interview of October 19th); laughing Mr. Ah San shared the story, adding further details to it.

KM: What is the difference from then to now?
JA It's getting drier and drier. Before, we had to take care of the rain gauges too.
KM: What was the rainfall?
JA: Pōhakuloa was about ten inches a whole year. Keanakolu it all depends. [chuckles] one time in the day time, in the 60s, we had flood, the gauge overflow in a few hours! One time I got stuck. The Keanakolu Ranch house flooded, I was going down to the log cabin, and the gully was flooded, we couldn't go past. So we stayed in the log cabin.
KM: So the weather has changed over the years?
JA: Yes...
KM: ...*Mahalo nui...!*

**Sonny Alohalani Kaniho
and Daniel Kaniho, Sr.
Oral History Interview with Kepā Maly
October 8, 1998**

Sonny Alohalani Kaniho, was born in 1922, and his brother, the late, Daniel Kaniho, Sr., was born in 1932. Their parents were Willie Kaniho and Daisy Awa'a Kaniho. Willie Kaniho was born at Kalopā, Hāmākua, in 1894, and worked as a cowboy on the mountain lands most of his life. The Kaniho family has been ranching since the nineteenth century, and as a result of their ties to Parker Ranch, Willie Kaniho and his sons worked all around the mountain and forest region.

The Kaniho brothers granted release of the interview transcript on November 25, 1998.

- KM: *Aloha...*we're here in Waimea at the home of Daniel Kaniho, Sr., *mahalo!*... Could you please share with me, your full name and date of birth?
- SK: My name is Sonny Alohalani Kaniho. My date of birth is January 27, 1922. I was born in the *ahupua'a* of Kawaihae uka, Kohala.
- KM: *Mahalo.* And uncle?
- DK: Daniel Kaniho.
- KM: No middle name?
- DK: No. I was born 1932, November 22nd.
- KM: Where were you born?
- DK: I was born in South Kohala, right in Waimea, here.
- KM: In Waimea?
- DK: Uh-hmm...
- Group: [Discussing experiences around the mountain lands.]
- SK: ...All my recollection, as I grew old and I knew that I was living in Humu'ula. But for backing up, I can give you some part of my biography of beginning from my birth place.
- KM: Good, yes.
- SK: If I go back a little bit, my dad was working for Sam Parker at one time, at Keanakolu. And he was under the supervision of Ikuā Purdy. But somehow, because of some kind of misunderstanding, A.W. Carter and Sam Parker did not agree, so Ikuā Purdy made a move of leaving the area so all of the cowboys that were working with him, left too. They all went to different places, but the majority of them went to Kaua'i, and from Kaua'i, other ranches picked them up. That's where my daddy was picked up, from Kaua'i. Either Frank Wood, or Sam Wood, I cannot recall which one, met my dad when he made a visit to Kaua'i.
- KM: So papa, William Kaniho...?
- SK: Yes.
- KM: Was not born here?
- SK: He was, he was born at [thinking]...
- DK: Kalopā.
- SK: Kalopā. I'll give you the biography I wrote on him, and from that, you can make it out. But anyway, Frank Wood got him coming back. So he came back and he went to work at

Kahuā and that's how he met my mother. He was a single man and one day he came back and he noticed there was a girl washing clothes along the river side, and that's how he got to meet her.

DK: That was down by Pu'uhue.

SK: Yes, Pu'uhue...

SK: [A.W. Carter asked Willie Kaniho to come back and work for Parker Ranch] He went to Ke'āmuku. He worked Ke'āmuku for a while, and then my sister was born there. When we went to Ke'āmuku, my mother was pregnant at the time. So I was born at Kawaihae uka, but when we moved to Ke'āmuku, my mother was pregnant and my sister was born.

KM: Hmm. And Ke'āmuku was mostly sheep at that time?

DK: Sheep and cattle.

SK: Yes, at that time it was both. But the sheep station was already at Humu'ula.

KM: 'Ae. Now, you said that a few years later, you moved up to Kalai'eha?

SK: Yes.

KM: Kalai'eha?

SK: Kalai'eha. We moved up there because there was a person who worked for Parker Ranch, he got caught in a high flood river. He tried to cross and he and the horse were dragged into the water.

KM: Where, here?

DK: Humu'ula.

SK: Up in the Humu'ula area.

DK: In Laumai'a.

KM: Oh, Laumai'a side?

DK: Yes.

KM: So he was working the mountain side?

DK: From Laumai'a, I think he was coming back to Humu'ula, on the horse, but the river was big water, so when he crossed, the river went wipe him out.

KM: 'Auwē! So that man, do you remember his name?

DK: Ishizu.

KM: So Ishizu was washed down?

DK: Yes.

KM: And then papa went to take care of Kalai'eha?

SK/DK: Yes.

SK: Why that was, in my looking into it, that's why I'm saying this. "Carter could only depend on him, because he was there in the Keanakolu area; he could cover there. And further more, because he was brought up by Ikuā Purdy. And under Ikuā's program, they way I look, Ikuā was asked by my dad's family in Kūka'iau, to train him.

KM: So your dad's 'ohana was at Kūka'iau?

SK: Yes. So he taught him about the mountain and things like that. And from my dad's work and from what I can recall, which I wrote down, he was at this time, he was a terrific person. A person without school, you know.

KM: Hmm, *na'auao* [intelligent]. Knowledge of the land and how to work it.

SK: Yes.

KM: When was papa born?

DK: Eighteen-ninety-four.

KM: And was he born out at that side, Kūka'iau?

SK: Yes, he was born in the Kūka'iau area. And at that time, there was a small little town that had a different name. The names of those days, do not exist because something has developed there.

KM: Hmm. Was he *makai*, or was he *mauka*, in one of the ranches, like what they call 'Umikoa?

SK: *Makai*.

DK: Yes, *pili* [next to] by the road.

SK: Yes.

KM: So that's how your papa initially became familiar with that side of the mountain, because his was up with Ikuā Purdy them?

SK: Yes.

KM: So they had *pipi* up there, Keanakolu?

DK: Majority was wild.

SK: Yes, those days, there were domestic and wild. But the domestic was brought in to improve the cattle.

KM: So they brought in better stock to breed?

SK: Yes. And the *'āhiu* [wild] were for sport [chuckles], they set 'em aside, they don't kill 'um all one time. But because of the life-style, instead of preserving, somehow, they continued to go after them for the sport.

KM: So the sport was that they go with *kaula 'ili* [rope], they don't shoot 'um?

DK/SK: No, no.

DK: All *wili kaula* [roped].

KM: 'Ae. So they ride horse and go after them?

DK: Uh-hmm. And I think they work more by night, they say.

KM: Hoo! How dangerous, no fall down break their neck?

SK: Well, like Dan said, they work by night, but the night work was a sport thing. They do other stuff during the day. But when come time for roping, they go rope when it's needed or something. That's when they rope, they don't go all the time. We just hear the old folks talk. So that's the way I hear them saying and this is my vocabulary.

KM: Good. So you were a couple of years old by the time you moved to Kalai'eha?

SK: I would say that I was not even two. The same year, maybe 1922, 1923. I cannot recall, what year it was.

KM: Yes... Hard life yeah, your papa them had?

DK: Yes.

KM: But they *aloha* that eh?

SK: I don't know, to them...

DK: To them, it was fun. I say, sports, I guess.

SK: More fun—the harder the competition, the more fun it was, yeah—than daily work.

DK: I used to hear him tell some people, they go night time and they wait for the cattle to come and drink water. They let 'em drink water first. Then after they drink too much water, they can hardly run.

KM: 'Ae. So they would come down to places...?

DK: They come way down by the river, so they get water.

KM: Oh, so Keanakolu side and Laumai'a like that?

DK: Yes. Most *'āhiu pīpi*, come out by night, day time they keep cool in the shade.

KM: Yes, smart too [chuckles].

DK: Yes. Most wild cattle, during the day, they all hide. They keep still. During the night, they come out, it's a little cool, they get a little dew on the grass, and they survive like that.

KM: Hmm. So in your time, and you said you pronounce it "Kalai'eha?"

SK/DK: Uh-hmm.

KM: [Speaking to Uncle Sonny] You were saying that you never heard them call that Humu'ula until later, until after you came back from the war?

SK: My recollection at the time, when I was small, and every time they talk, they used the word, "Kalai'eha." But after a while, somehow...I don't know how Humu'ula came in, but every call made from there to here, or from here to there, they referred to it... Like from Waimea, when they call to get any part of that area in Humu'ula area, they want to talk to Humu'ula area, they have to call Kalai'eha first. So the operator connect him to the next station. And they do that for come back.

KM: Sure, like you said before we started the interview, this whole *ahupua'a* was Humu'ula, yeah.

SK: Yes.

KM: So it goes all the way from *makai*, comes *mauka* and goes across?

SK: Yes.

KM: So Kalai'eha was the station that was there?

SK: So right where we stand, we go this way [points to the map, gestures around the mountain].

KM: So right around?

SK: Humu'ula is on the Hilo side of Mauna Kea.

KM: 'Ae. This map that we have here in front of us is HTS Plat 613, it was done in 1933. Now you were born in 1932?

DK: Thirty-two.

KM: So just when you were a year old. This was from when they finalized the fence line to around.

DK: Hmm, the boundary.

KM: Yes, to go around Mauna Kea.

SK: Okay, when you talk about that, that became a project because of the depression in the 1930s. That's when the conservation program came out. And that program went to Hawai'i and the other forty-eight states in the mainland. Because I've been here, then when I came back from being stationed in Europe, in the military, and I met the same people. And all the cabins that were in the government land, or reservation land, they were all conservation camps. They called it the CC Camp.

KM: That's where Johnny Ah San was working in 1933.

SK: Yes. So in Hawai'i here, the main station was in Waimea.

KM: Oh.

SK: Yes, that was the main station. Then they went around, right around. But they built...the conservation thing was, in my opinion, was something to put the land back to its proper condition and to better the vegetation. But after the CC closed and the war came in, and then after the war, conservation practice was like a forgettable thing.

KM: So at that time, what they saw was... Well, how come they felt they had to protect the forest? What were they protecting it from?

SK: The forest is the trees.

KM: So what were they protecting it from? Why did they make the fence line?

SK: To keep the sheep out.

KM: So the sheep were very plentiful?

DK: Yes, yeah. Plenty of sheep.

KM: So the sheep were having an impact on the forest?

SK: Yes, they impacted the forest. Not only in the forest, but they come down in the ranch lands too.

KM: So they competed for food with the cattle?

SK: Yes.

DK: Uh-hmm...

Group: [looking at HTS Plat No. 613 – discussing various localities and trails]

KM: ...This trail comes down, that they now call Mauna Kea-'Umikoa Trail...

DK: Yes.

SK: Hmm.

KM: This trail comes down. Here's Pu'u Mākanaka, and then there is the red hill below, Kaupō. So this is the big *pu'u* on the side of Mauna Kea. So if you were *mauka* here, you would see this. Johnny Ah San also mentioned that above Kanakaleonui, he knew that there are *iwi* [burials]. [looking at map to identify locations] Hopuwai. Here's Keanakolu, Pu'u Kālepa...

DK: This is way down.

KM: Yes, and that's the summit there. But papa, and this is important, because you mentioned that in the cinder cone, along the rim of the cone, papa said that there were *iwi*?

DK: Yes... [section modified from original discussion as we get bearings on distance from summit to Mākanaka and the Kalai'eha-Keanakolu road] From the summit here, a little bit outside, has a little bit more mountains.

KM: 'Ae, so when papa was talking about the burials, they were on the cinder cone?
DK: Yes.
KM: Did he describe them at all? Were they in the cinder, or did they build stone platforms, *pū'o'a* or something?
DK: Well, we didn't go over by the mountain, but he said, "You folks see the mountain over there, all on the rim there..." He said, "Get people buried on top of there."
KM: Did papa say anything about who those people were?
DK: No, he didn't.
KM: Or why they were buried on top of the mountain?
DK: I guess that was maybe before his time too, I think.
KM: 'Ae.
DK: You know. Then by Kanakaleonui, one time he took people from the museum, they went up there, in the big hollow where the sand is. They went, he took them and left them there. They went dig out the bodies.

H.E. Gregory's 1926 field notes in the collection of the Bishop Museum record that on July 22, 1926, he met with Willie Kaniho. W. Kaniho took Gregory up to Waiau and the summit region of Mauna Kea. On July 24, 1926, Gregory records that the party traveled along the mountain road from Humu'ula past Wailuku, and on to Pu'u Kanakaleonui. At a *pu'u* for which Gregory did not record a name, he reported "four upright skeletons, Hawaiians." (Bishop Museum Collection; MS SC Gregory Field Notebook Box 12.3 pp. 14-19) BPBM Photo No. CP 14970 shows Willie Kaniho and Lester Bryan sitting outside of a burial cave on Mauna Kea; the Kaniho brothers did not recognize the location.

KM: Ohh!
DK: You know, to study.
KM: Yes. What do you think about that today? If there are *ilina* [burials] on site, say atop Mauna Kea, what do you feel should be done, how should they be treated if they are up there?
DK: Well, the way I feel, I don't want to touch them. I feel, just leave it alone.
KM: So leave them as they are?
DK: Yes.
KM: Uncle Sonny, you think...?
SK: Historically, all burials, what Dan said, "not to touch" is the best way. But, a history must be provided, otherwise destruction occurs.
KM: Hmm. So the idea is, if people know that it's there, we record the history...?
SK: Right.
KM: So that it's known, otherwise if they don't know, then they bulldoze...?
SK: Yes. But traditionally and historically, history is the best part of everybody's life. Especially, now we're talking about the 1700s and what, all this comes up and many of the people don't know this. And the most important part in my opinion, the old people were self educated, and surprisingly, their public speaking and ways of presenting is amazing! In my opinion.

KM: 'Ae.

SK: That's why I always say, 'a history or something has got to be written by interested people, to provide for the thousands of years of history, to look back.

KM: Yes, that's right. And that's why, we are recording now with you, brother, and the other *kūpuna*. Then people will know. It's like your papa's history. [pointing to the photographs] Here's papa on the mountain in the 1920s.'

SK: Hmm...

DK: [thinking – looking at the Mauna Kea-'Umikoa Trail]

KM: See, this trail goes all the way down. Mākanaka; Kaupō or Red Hill?

DK: Yes.

KM: Cuts down, goes past Kanakaleonui?

DK: Yes.

SK: And Kanakaleonui is way down.

KM: Yes.

DK: So this *ala nui*, that's the way *mauka ala nui*.

SK: Yes.

KM: This is all the flat land, the plateau, sloping down gently.

DK: Okay. Was Mākanaka that papa was talking about.

KM: Okay, so this is almost at... So you were looking to Mākanaka side, looking down from the summit?

DK: Yes.

KM: Yes.

SK: And this is the road that goes around from the sheep station, here.

DK: Uh-hmm.

KM: 'Ae... We've looked at these old trails here. The trail from Humu'ula side and this 'Umikoa Trail. And there is the old Laupāhoehoe-Waipunalei Trail.

DK: Yes, Waipunalei.

KM: It cut up the slope here. Johnny Ah San calls this "Umi's Trail," because has the *heiau* for 'Umi down there. And it goes up there to Mauna Kea.

SK: Oh, oh...

KM: And one of the interesting stories that Johnny Ah San shared was about your papa working at Keanakolu, and that Eben Low lost his hand in one *pu'u waiū*.

DK: Oh, roping.

KM: Yes, bringing in one wild steer.

DK: Yes.

KM: And they tied it around the tree or *pu'u waiū*, and he lost his hand up there. Your papa evidently...have you heard that story?

DK: Gee, I never heard.

SK: I never heard. I always heard about Eben, they always talk about Eben Low, but I don't know whether he had one hand or what. Now that you're talking about it.

DK: Yes.

SK: I don't know.

KM: Ah San said that your papa was very protective...that *pu'u waiū* was very special to him. And so we are going to try and see if we can relocate it. The Keanakolu Ranch house was burned down, yeah?

DK: Yes, it burned down, but the old place is still there. I don't know if the shear house is still there.

SK: I think the shear house is still hanging on hairs [chuckles]. Yes, hanging on hairs.

KM: [chuckles]

DK: The old shear house.

SK: A long time ago, we would pass it, but I would always think... I would take my wife, the kids.

DK: The house they get now is Waipunalei.

SK: It's private land now, Parker Ranch's own land. Before it was on the State land, then the Hawaiian Homes got that portion and it was still in there. But like you bringing up all these subjects, and Hawaiian Homes coming in, I'm going to make sure all those historical sites are mentioned.

KM: Yes... Earlier, you mentioned this Hakalau Refuge, they are making an effort to preserve some of the habitat of the native birds in the forest.

SK: Yes.

KM: And that's a long time effort, Lester Bryan and Johnny Ah San them, their whole thing was conservation.

SK: Yes. That's why like on the Humu'ula lands, it's all conservation. Those things have to be protected. It can be used but you cannot put too much population up there. You can put cabins here and there, for short time, but you got to keep in one place. Otherwise, you annoy the birds or something like that.

KM: Yes, that's right. And that population has been steadily diminishing, even the *māmane* and the *naio* forests...

DK: Yes.

KM: So have you noticed that the land has changed in your life time?

DK: Yes, it's changed.

KM: The forest?

SK: It went down.

DK: Yes, way down.

SK: That's the thing that I was after the State, they failed their duty to exercise conservation.

DK: Well, you blame the State, but way back before we always did plant trees, plant trees and plant more trees.

SK: Yes, now, they don't do.

DK: Now, they don't do that, and I don't know why.

SK: After the way, everything was changed. [gestures money with his hand] In Europe, they said , "dola."

KM: Hmm. You know, one of the other things that was brought up to me, was this fountain grass, even if they fence in an area, but the fountain grass comes and there's a fire, *pau*, every thing is gone.

SK/DK: Yes.

KM: So it's not only planting, but stewardship also? We've got to take care and go and garden, weed just like?

SK: Yes.

KM: ...So if everyone understands more of that history, we can all do a better job of taking care of the land. And uncle, you were going to say something about what should happen.

DK: A part I'm disappointed about, you know, when they eradicate everything off of the mountain, I kind of disagree with that. 'Cause, you know, we used to live off of the land. Wild game and what not. But today, they eradicate all the sheep, the pigs, and I wonder why? I think that all the animals survive on one another.

SK: You know, what you say, is good. The conservation part, the animals had to be taken down, the only trouble was they cut down and the weather went change. We don't have the moisture, the rain, like before. That's why the seed is not viable, everything is dead. But if we can bring back the vegetation, like trees, then the animals look prettier on the land [chuckles].

DK: Something got to come back first, before you can bring back the animals.

KM: Sort of a balance. I guess that's what happened, they took all the animals off, then all the weeds grew up, and the weeds have impacted the land.

DK: Uh-hmm.

KM: And you said, the land has changed since you guys were young.

DK/SK: Yes.

KM: I think you even said the weather has changed?

SK: Yes.

DK: Everything goes.

KM: So when it's barren, everything dries out?

DK: Yes. Before, the sheep controlled the grass, everything was under control. I could see that they should limit, it was over populated. Then you can allow people to hunt more. But when you eradicate, hoo!

KM: Yes... Maybe we could make arrangements to go *holoholo*, Uncle Teddy Bell and others...

SK: We've got to get everybody to go out!

DK: Uh-hmm...

KM: *Mahalo* – thank you so much. Maybe if we can get the time so everyone can go *holoholo*. And if we work it out, maybe we can get Johnny Ah San to go with us.

SK: They have to work with the people who are of the land, and other old timers who know the mountain. That way they can know what's right and what's wrong.

DK: Work with the families...

KM: Thank you, I really appreciate so much that you were willing to sit down with me...

**H. Peter “Pete” L’Orange, Jr.
Oral History Interview with Kepā Maly
October 19, 1998**

Pete L’Orange was born in 1933, at Waipahu, O’ahu. His father’s family came to Hawai’i in the 1800s, and initially settled in the Waimea-Kekaha District of Kaua’i. His mother, a Williams, was descended from the Ma’ilolo Kūpihea line of Kaupō, Maui. His family was close with the family of A.W. Carter, and spent a lot of time at Parker Ranch. Pete’s first trip to Humu’ula region was in 1941. Subsequently in his teenage years, Pete spent summers in Waimea, living with Hartwell Carter and working on the ranch. In those early years, He spent quite a bit of time with the old Hawaiian cowboys, like Hogan Kauwē and John Purdy.

After going to college on the mainland, Pete came back to Hawai’i and worked at Parker Ranch. In the period between 1959 to 1965, he was the manager of the Humu’ula ranching operation, with responsibility for the lands around the Hilo Forest Reserve. In those years, Pete worked with Willie Kaniho, Tommy Lindsey and a number of the old Hawaiian cowboys.

Mr. L’Orange granted his personal release of the interview on November 12th, 1998.

KM: Could you please share with me your full name and date of birth?

PL: Hans Peter Faye L’Orange Jr. I was born October 17th, 1933 in Waipahu.

My father was in the sugar business, and his father brought the Norwegian sugar workers to Hawai’i. He started sugar plantations on Maui, and after they struck there, he decided it was not a good place to live so he moved to Kaua’i... On my mother’s side, my mother was part Hawaiian. Her family is from Kaupō on Maui. Her grandfather was a sheriff in Kahului or Wailuku, I’m not sure which. Her father was a photographer, J.J. Williams.

KM: Oh.

PL: He was one of the early photographers in Honolulu. He was a friend and confidant of King Kalākaua. Not involved as far as I know in any politics, they were just good friends...

KM: ...You mentioned earlier that you came home up here to Parker Ranch. And we’re looking at HTS Plat 613 of the Mauna Kea Forest Reserve.

PL: Uh-hmm.

KM: And we were talking briefly about the old Waimea-Humu’ula or Kalai’eha cart road.

PL: Yes.

KM: You mentioned that as a youth, you traveled that road. How did you happen to come up here, and what was your earliest trip into the mountain region?

PL: It would have to be in about 1941. I came up to a sheep shearing. Parker Ranch had Ford cars with tires that were a little bigger than normal and pretty strong suspensions, and we came in those cars.

KM: Was papa somehow involved? What brought you up here?

PL: We were visiting with Hartwell Carter, who was the manager of Parker Ranch. So we just came up. The hardest part of going to Humu’ula was coming up to Waiki’i because the cars would boil, going up the hill. You didn’t have the kind of systems that you have now, so the water would boil out and you would have to stop, cool down, and put water.

KM: Ahh. And I guess there were a number of stops that had to be made on the way, to open and close gates as well.

PL: There were lots of gates, yes...

KM: On this map here [pointing to locations on HTS Plat 613], we see the general alignment of some of the Humu'ula Ahupua'a.

PL: Uh-hmm.

KM: Kalai'eha *pu'u*, the location of the sheep station, originally?

PL: Uh-hmm.

KM: I guess your [Parker's] boundary came *mauka* of Pu'u 'O'o.

PL: Pu'u 'O'o was Parker's *makai* boundary. And this would be the *mauka* boundary [indicated on HTS Plat 613].

KM: Yes, that's your *mauka* boundary. So there were always sheep here, is that correct, but you were brought in to...?

PL: Increase the herd. I think way, way back, before Willie came up here with bulldozers, after World War II...see, there was very, very little water. And sheep don't need the water, so this was basically sheep. There were cattle towards the Keanakolu side.

KM: Ahh. So Willie came up with dozers to develop water...?

PL: The waterholes. He dug waterholes, ran cattle around them to compact them, so he made it possible to run a lot of cattle up there. I don't know how many cattle they had before that time, but when I was up there, we had eight to nine thousand heifers. And the sheep, we had 15,000 we could have had 30,000 sheep and still run 9,000 heifers.

KM: Wow!

PL: There was no problem, because the sheep went all on this *mauka* section [pointing location on map]. From about here, Kanakaleonui, back.

KM: Ahh.

PL: That's the hill that I was told, supposedly you could see Hilo from there, and there was supposedly somebody that went up there and yelled down to Hilo.

KM: Ahh, so that's a story about the "Man with the big voice," because he could be heard all the way down?

PL: Yes. So I don't know. Now, there was a spring up here and they used that spring for some water. The spring didn't have a tremendous capacity.

KM: Yes. On October 9th, I went up with Johnny Ah San, he's 91 now.

PL: Oh, yeah.

KM: He's doing good. We went up and he showed us the three caves...

PL: Ke-ana-kolu, right.

KM: And it was really interesting. He's got a great memory and a lot of stories about the land.

PL: Uh-hmm.

KM: What I'd heard, was that even Willie Kaniho, sort of under the tutelage of Eben Low, started in the Keanakolu area.

PL: Yes.

KM: Did you ever come up through this area with him?

PL: No. I mean, the first time we drove cattle up here, when I took over as foreman, he was there. We were taking cattle around the mountain from here [Kalai'eha] into Keanakolu, separated them and took them around.

KM: So you would follow the trail around, and past Hānaipoe and go out?

PL: We went through Hānaipoe. And the cowboys from Waimea would come up and sometimes they would bring cattle, young heifers, and they would be up around Hānaipoe. They would bring them half way through Kūka'iau and we, from Keanakolu, would come half way and would switch and take the young heifers back, and they'd take the older market heifers to Waimea.

KM: Hmm. So this *mauka* land was sort of where...?

PL: They raised replacement heifers and market heifers. They have a different use for it now, but at that time, that's what we raised. It was a little different management system then, that the cattle were taken to where the grass was, when the grass was there, and then taken out. Penhallow had a different management system, based on tasks and functions. I am a good friend of Dick's, he's wonderful guy, but I think he was wrong in that.

KM: Hmm. It seems logical that you need to look at the lay of the ground and understand what it's carrying capacity is at the time.

PL: Right.

KM: And then move 'um out.

PL: That's right.

KM: So different styles?

PL: My understanding is, and Sonny or Danny could tell you, Willie was a pretty young boy when he was at Keanakolu.

KM: Yes, very young.

PL: And the only stories I heard about there—I think Willie was the one that told me, but I'm not 100 per cent sure—is that they would have roping contests there. Weekends or whatever. And he would be the one sent down to Laupāhoehoe or Waipunalei for the *'ōkolehao* [chuckles]. Which of course was a no-no as far as A.W. Carter was concerned. That was not allowed.

KM: Hmm, they had their fun eh? And I understand that it was at Keanakolu, at the old ranch house that there is the *pu'u waiū* where Eben Low lost his hand as well?

PL: Yes, yes. I think that is one of the things that's never been written down about Parker Ranch, never really recognized, is that Hartwell was pretty astute in keeping the egos of his various people, cranked up and going in competition among them. But keeping them separated. Willie Kaniho, Joe Pacheco, and Yutaka, and Harry Kawai got along and smiled, but professionally, they were in competition. There was a tremendous amount of competition for the boss' favor. Hartwell was very astute at keeping everybody happy, more or less.

KM: Hmm. In those days, [pointing to the map] this is generally the boundary between Humu'ula and Ka'ohe. And there was the forestry fence line that had been put in. Were the sheep and cattle mostly contained, or occasionally, did you have to go onto the mountain?

PL: No, we never went on the mountain. That was a no-no.

KM: Did you see any silverswords when you were young?

PL: Not when I was young, but when I was at Humu'ula, I saw a silversword right up here [pointing to location].

KM: Ah, Kanakaleonui vicinity?

- PL: There was one in the gulch where the spring was. Then I saw silverswords over here on the road to Mauna Loa, past Pu'u Huluhulu. But those were planted, and I think they came from Maui. I'm not sure, but they were planted in there. There were spruce trees and all kinds of plantings done. But I only saw one silversword, it was about twelve or fifteen feet high...
- KM: Okay. Now, my understanding is, that in those early days that you were there—when people like Lindsey, Purdy and others were around—discussions about sites, features, and stories?
- PL: That really never occurred. The only stories were the ones like I related, where Willie went down to get the *'ōkolehao*. The stories that I heard, were more recent. I mean, Johnny Ah San and the rest of the forest rangers listening to the World Series up here on a hill when Bill Bryan comes over the top [chuckles].
- KM: Oh no! I hear he was a real task master.
- PL: Oh yeah, but they swore by him. He was good to them. But they were...well, he was a colonel. I wasn't there. I think that one of the things to me, that's unfortunate about the mountain and the management, is when they went away from the forest ranger, like John Hansen here [pointing to Pōhakuloa side], and Johnny Ah San over there [pointing to Keanakolu side], there was a relationship between the forest ranger and the land owners, and we worked together. They had certain capabilities that we didn't have. All the fence lines were broken down into sections, from here to here, was Parker Ranch. From here to here, is Shipman, from here to here is the Territory, and from here to here is Parker Ranch. And everyone had their areas of maintenance. But if you found something wrong, regardless of where it was, you fixed it. And then you let your partner know.
- Bill Bryan controlled the hunting in Laupāhoehoe and Pihā forest, and of course, they had to come on the road around. If we ever observed jeeps in our pasture land, which they would do. I mean, there was no such thing as going to court, he just didn't give that hunting party another permit. It was very effective.
- KM: Sure, everyone was responsible for their actions.
- PL: Yes. By the same token, if we went into the forestry area for any reason, or they had to do something coming through us, there was always communication. So there was a really strong relationship, which has been lost with the new management style. Parker Ranch at Waiki'i had thousands and thousands of acres of public hunting. Thousands of acres, and the Fish and Game helped police the Parker Ranch areas. We had deputy game wardens, and we had a predator control program to knock down the predators; you know, cats, mongoose, that sort of thing. But again, it was a relationship of mutual trust and respect, working together. You don't see that between large land owners and government, right now.
- KM: Yes, it's changed. And it seems that the resources are suffering.
- PL: Yes, definitely! Definitely! I have tremendous worries about the native forest on Mauna Kea. The decision made by the court to take the sheep out, protects the birds, but you have an understory there, that when a fire gets up top there, it's going to wipe everything out. It needs to be managed.
- KM: You're right. You can't do it at only one level, it needs to be integrated into all of these areas coming together.
- PL: Yes. There has to be some management and there has to be some sheep up there, if you are going to keep the grass down.
- KM: In an interview with Judge Pence, he was very vocal about what you're saying too.
- PL: I can imagine...

- KM: ...Would you mind sharing with me, a little description of the sheep operation at Kalai'eha? What was going on, how many people, who were some of the cowboys that you were working with?
- PL: Well, we had a gang at the sheep station and one at Keanakolu. The Keanakolu one was three or four Filipinos. They basically maintained fences and saw that everything was going okay. The Keanakolu foreman was Bartalome Dadolia. Then Bartalome died in a tragic car accident. I think he got into some of Johnny Ah San's booze, because Bartalome had a car, but he never drove on the government road, because he didn't have a license. But this time, he went down the Kūka'iau Road and at the bottom, he drove into a culvert. And the culvert went down fifty feet, below the Māmalahoa Highway, and he got cut and bled to death.
- KM: 'Auwē!
- PL: Then there was Denicio Lorente who was foreman after that. Denicio supposedly ran a house of ill-repute in Kohala and got into trouble [chuckles], and had to go up to the mountain to get out of the way. The cook's name was Jose. One of the reasons that it was Filipinos is that they were single and they were willing to work up on the mountain... [phone rings – tape off]
- ...Then we had a few Hawaiian cowboys at Kalai'eha. Louis Akuna, Francis Pelekāne, and there was a Hawaiian from Waimea, that was more Willie's generation, Thomas Leiana, and then my foreman there was Take Horie, from Hilo. [thinking]
- Just talking about Bartalome, it's kind of a side story, but it is an interesting story. Bartalome called me up one night, he had been drinking, and he wanted to go to Hilo because he was sick. I told him fine, I would send him down the next day. "I want to go tonight." I said "no." So he called me back and said, "Ramone Rabara will drive me down." I said "Okay Bartalome, you can go." So they went down and Ramone lived at Humu'ula but he had a wife—they had grown kids, who were older and out of the house by then—she lived in an apartment on Mamo Street. Well, the night that they showed up there, the next morning was the tidal wave of 1960.
- They'd had a night of carousing, and Bartalome was passed out, so Ramone got his wife out of the house, and they went up. But he started worrying about his buddy Bartalome, so he went back and when he went back, the wave hit. It was moving the apartment house and they jumped out of the window of the apartment house onto the marquee of the Mamo Theater.
- KM: Gee amazing!
- PL: And Mamo Theater survived and they survived. But Bartalome's jeep was never seen again. Strange story.
- KM: Yes, it's amazing. [looking at the map] This is the upper road to Keanakolu, I guess Parker Ranch's road, and here's the lower road from Pu'u 'Ō'ō that connected up at Hopuwai. Did Parker ranch put this part of the trail in?
- PL: My understanding is that it was a Territorial Road.
- KM: Hmm, in fact the County still maintains a part of it.
- PL: Yes, certain parts. We questioned it at one point, where we wanted to take a cattle guard that was on the Saddle Road and move it over here, and they said we couldn't take it from a Territorial Road to a private road. And I said "Fine, that's really interesting, would you confirm that in writing?" [chuckles] I would have locked the gate.
- KM: [laughing]

- PL: We would have had a lot less problems. You know one story that I heard, and I don't know how they did it, but at Laumai'a, there was quite a settlement there. They used to catch wild pigs and they would drive them to Hilo. I don't have the foggiest idea of how they drove them to Hilo, but they came down a trail here, some way. Whether they tied 'um together...I can't imagine driving wild pigs. This was way, way back, Sam Parker's time, or before. But the diaries there, that's where I picked it up. It said how many pigs they caught and how many they drove to Hilo.
- KM: Hmm. Does this go back to Haneberg's time?
- PL: I don't know. I had no relationship to the guys. It was just in the books that were lying around in the old house here, Sam's house. It was obvious to me that they were something that should be kept. They were just on the porch, and getting wet and whatever. So I shipped them to Waimea, and I don't know whatever happened to them.
- KM: Hmm. I'm very interested in the diaries. I've been hearing a little bit of information about the building of the walls for the early sheep station in Haneberg's time. I guess around the 1880s, 1890s.
- PL: I think that HPA got a lot of stuff from there. Some of it may have disappeared. Again, it was just in a warehouse some place.
- KM: When Penhallow brought you out here, you said the sheep were around 3,000 head. How high did you get them, what was the population?
- PL: Okay, I built the herd from 3,000 to 15,000 in five years.
- KM: Wow!
- PL: We had a couple of problems in that we had a mite that caused scabies. And when I brought the new vet up to here, it was obvious that once he saw what we were dipping with, that it was not appropriate. So he prescribed dipping all of the sheep within a two week period to break the cycle of this mite, which we did and we eliminated scabies. The federal people wanted me to do it again the next year, but we were very short of water, and it takes a lot of water to dip sheep, and we just didn't have that luxury. So they said well, if you don't do it, we won't lift the quarantine. And I said, "Fine I don't need to lift the quarantine anyway, I don't ship live sheep any place."
- KM: Hmm. So the primary business was?
- PL: Originally, the sheep were Marinos, a good quality wool. They were raised for wool. When we got into it, we found that there was an excellent market in Honolulu. One supermarket wanting 100 a week. We sold 100 a month in Waimea, and I couldn't supply 100 a week and increase the herd at the same time. So we sold 100 a month to Honolulu. So we were killing 200 sheep a month. We graded all of the sheep as far as the quality of the wool, and it became obvious that the quality varied a lot. So we kept the best quality sheep, as far as wool was concerned, in one breeding herd. Then we brought in mutton-type rams and bred the other side to the mutton rams and we were producing lambs of market age, five or six months with just a little protein supplement.
- Willie for all of his knowledge about cowboying and that sort of stuff, didn't really have any knowledge about animal husbandry and that type of thing. And I think in the past, A.W. was calling the shots as to what was happening. Willie and Rally really didn't like that sheep because they were a lot of work. They didn't like the shearing. It was a difficult job. Tremendous potential. We were making more on our mutton per pound than the ranch was making on beef. We also got into a breeding program to raise our own rams based on their wool production. So we had about 300 ewes that were bred under very controlled conditions and measured the pound of wool that they produced because pound of wool per sheep is very heritable. We had a really good program going, and then I got moved into the office, supposedly to take over as business manager of Parker

Ranch, which never happened. But subsequent to my moving, Rally was the manager, Norman Brandt was the business manager. Rally didn't like sheep and I think Norman was worried about how much we were paying the men to shear the sheep, because they got an awful lot of money relative to other employees for very hard skilled work, and being worried about the union, they decided to cut out the sheep.

KM: So how long were you out here?

PL: I was there for six years, about 1959 to 1965. Another one of the problems with the sheep that we addressed and wiped out, and again, through a partnership. During World War II, the second Marine Division was the first Marine Division that came to Camp Tawara. The Fifth Division came after. When they would ship out, the Marine Camp would set up a facility there to gas all the pets, destroy all the pets that they had accumulated. And of course, some people didn't want their pets destroyed. And they let the dogs go. And those dogs, not all of them, but some of those dogs, for whatever reason, moved onto the mountain. And there was a pack of wild dogs that didn't know man, didn't know anything.

KM: Hmm. So that was in the period after World War II?

PL: It would have been into the 1950s before that really materialized. I lost 200 lambs one night to dogs, that's how devastating they can be.

KM: Wow!

PL: And they traveled the whole mountain. It wasn't a large pack, it was about six or eight dogs. They would shoot them when they had opportunities, but they were pretty smart. So what happened is that the Fish and Game was releasing mouflon sheep onto the mountain, so they wanted to protect the mouflon sheep from wild dogs. So we went into a joint program to eradicate the dogs through the use of a poison called 10-80. And the reason 10-80 was good, is that it lasted in the carcass for three weeks or so. Where strychnine would last for two or three days. So you took a carcass, or a quarters, and you injected it, and it was a systemic poison. Meaning that if the pigs ate the poison, the meat, they would die. The dog ate the pig, the dog would die. And so in conjunction with the Fish and Game; we provided the bait, they provided the poison because we couldn't use that sort of poison. It was used by a government agency. And they set up bait stations around the mountain. They were all posted and signs to warn the people, although 10-80 supposedly didn't affect humans, but [chuckles] who wants to try? Anyway, the program was successful and the wild dogs were eliminated.

KM: So it was just a small pack, but they were a very successful hunting pack?

PL: Yes. Of course they would breed and produce more, but the survival was relatively limited.

KM: Yes. I'd heard about the dog problem, but didn't realize that it was as recent as the 1950s.

PL: Yes. It was a product of the Marines.

KM: Yes.

PL: So again, most of the employees that were there, were single. And one of the incentives for single employees, was that Parker Ranch provided a cook and all the food. I would use 500 pounds of rice a month, and I bought five pounds of garlic a week [chuckles]...

**Elizabeth “Tita” Kauikeōlani Ruddle-Spielman
and John K. Spielman
Oral History Interview with Kepā Maly
November 3, 1998**

Tita Ruddle Spielman was born in Hilo, in 1924. She is the daughter of Annabelle Low-Ruddle and Albert Ruddle, and is of part-Hawaiian ancestry. John Kurt (JK) Spielman, the son of Tita and Joseph Spielman, was born in 1959. Through the Low genealogy, Tita (and her children) are descended from the Parker line, and tied to the genealogy of Kamehameha I.

The Spielman’s ancestors have lived in the Kohala region for generations, and since the early nineteenth century, the family has played a significant role in land use practices on Mauna Kea and in the Hilo forest lands. In the period from the 1880s to ca. 1920, Tita’s grandfather, Eben Low (1864 to 1954), managed large tracts of ranch land on Mauna Kea, and in the districts of Hāmākua, Kohala, and Kona.

He traveled around and across the entire mountain, learning about its resources and nature, collecting many early photographs, and developing an undying love for Mauna Kea. Low’s unpublished journals (excerpts viewed in the Spielman Collection), also record many events in history that he participated in from the forest region to the summit. His writings also reveal the impacts that he felt as a result of the unstoppable changes that were occurring in the Mauna Kea forests and uplands as a result of the growing ranching operations.

Eben Low’s attachment to Mauna Kea was also very personal. In 1892, while rounding up wild steer in the Hopuwai-Keanakolu vicinity, Eben lost his left hand. Rather than turning him away from the land, he returned and worked the region with all of the noted cowboys of the mountain lands of Parker Ranch and the various Shipman holdings. In the excerpts from the larger interview, that follow, Mrs. Spielman shares stories she learned of her elders traveling the Laupāhoehoe-Waipunalei Trail, and of events in their lives. JK adds to the discussion by referencing notes from his great grandfather’s journals, in which he described the forest lands and changes he had witnessed in his life time (ca. 1875-1950).

Mrs. Spielman granted her personal release of the interview on November 25, 1998.

KM: *Aloha!*

TR-S: *Aloha!*

KM: Thank you so much for letting me spend some time with you folks today to talk story about your ‘ohana... Could you please share with me your full name?

TR-S: Yes. Elizabeth Kauikeōlani Ruddle-Spielman.

KM: And your birth date?

TR-S: February 16, 1924.

KM: *Mahalo.* [looking at J.K.] Would you please give me your full name and birth date as well?

JK: John Kurt Spielman, May 9th, 1959.

KM: Okay. Now, as we look back to your family, who are your parents?

TR-S: My parents are Annabelle Dole Low-Ruddle, and my father was Albert Ruddle, he was from England.

KM: Okay. So from your mother’s side of the family, which is what we’ll focus on...

TR-S: Uh-hmm.

KM: You have a long history, a relationship with this region, with the ranch lands...

TR-S: Yes, very much so.

KM: Could you share with me a summary or overview of what you understand is your family's relationship to this land, and the tie to the Mauna Kea region?

TR-S: Well, it was through my mother, because of course, she grew up in Kohala and spent a lot of time there. And at Pu'u Wa'awa'a and Kīholo, and always loved Mauna Kea. She used to say "That's my mountain." And so we got to know it and love it as we do.

KM: 'Ae... And your mother's father and mother were?

TR-S: Eben Parker Low and Lizzie Napoleon-Low.

KM: Do you have grandpa's full Hawaiian name?

TR-S: It is a very long name.

JK: Twenty-seven letters.

TR-S: [Asks JK to go get a photograph of Eben Low with one of his calling cards inside.]

KM: Okay. I saw it in his obituary from January 11th, 1954. After I spoke with Toshi Imoto about the trip that they took with your grandfather's ashes to Mauna Kea...

TR-S: Right.

KM: I wanted to confirm when that occurred. In reading the obituary, I wasn't sure if there was a typographical error, so I wanted to clarify that with you.

JK: [hands Kepā the framed photograph]

TR-S: There you go.

KM: Okay. This is a photograph of your grandpa and who?

TR-S: Will Rogers.

KM: Awesome! Look all the *lei* that he is wearing.

TR-S: They were very dear friends. In fact, grandpa sent one of his *kaula 'ili* [rawhide ropes] to Will Rogers.

JK: It was a gift, they swapped.

TR-S: I believe that it is now in the Will Rogers Museum...

KM: Yes. [reading the calling card] It says, "Eben P.", which was Parker?

TR-S: Parker.

KM: And then, the Hawaiian name, "Kahekawaipunaokauamaluihi Low." So Eben P. Kaheka-wai-puna-o-ka-ua-a-maluihi Low; I think that the newspaper misspelled the Hawaiian name.

TR-S: Yes. That was his calling card.

KM: Yes. Your aunt, Clorinda Lucas noted that the name was describing something like, 'the flowing waters from the spring in the rains of Maluihi.' The obituary referenced the name as being tied to a place name as well, he was named for this place...

TR-S: Area.

KM: Have you heard where that is?

TR-S: No, I'm not sure, I couldn't verify that.

KM: Okay. Beautiful. Now grandpa, I think, was born in the 18...

JK: I think it was around 1865.

TR-S: It's in our family Bible there [JK goes to get the Bible].

KM: Was he born on this island, Hawai'i?

JK: He was born in Honolulu.

TR-S: Yes, Honolulu, I believe.

JK: The son of John Solmes Low.

TR-S: The Bible is a Parker Bible, but grandpa is in it...

TR-S/JK: [looking through the Bible for Eben Low's birth information] These are old letters of Sanford Dole.

JK: Here's all the Parker's, Waipā, Low. John Solmes Low was born in 1830. Kekapa Ka'au'a. Eben Parker Low was born October 23rd, 1864, in Honolulu.

KM: So his family, your family has on the Parker side...he is a Parker descendant as well?

TR-S: Oh yes.

KM: Now, if I recall, was it Kipikāne, the chiefess that Parker married...?

TR-S: Uh-hmm..

KM: ...was tied to these lands of Kohala as well. Is that correct?

TR-S: Yes, I believe so.

KM: So there is a long history, many generations of the family in this region.

TR-S: Yes.

JK: It goes all the way back to Kamehameha, I believe. Our genealogy comes down from Kamehameha. I am the ninth generation, it just continues down.

KM: Hmm.

TR-S: You may want to look at this, because this shows you the family. This is the 1700s, these are the Parkers and descendants.

KM: [looking through genealogical records] Hmm. Does Sanford Dole come into this by marriage?

TR-S: No, no. *Hānai* [adoption]. My grandmother was *hānai* by the Doles.

JK: Lizzie.

KM: Okay.

JK: You know, in talking about Mauna Kea and the family and how far it goes back, I think that Eben Low, probably of all the people, was the most connected to Mauna Kea. In the sense of working it, living it, being on it, losing his hand on it, on knowing the mountain...

TR-S: Uh-hmm.

JK: Better than any of our family ever did. That is definitely the strongest connection.

TR-S: And my grandmother went... I don't know if you're interested in this...

KM: Yes, that's Lizzie?

TR-S: Lizzie. One time, she went with him up on the mountain, and for some reason... Well, they were going after a wild bull, grandpa said. So they didn't want the women to go. So

they said, "You wait here by this tree." So they did, and my mother told me that grandma told her, they were gone for a long while, and all of the sudden, this owl, which was one of the *'aumakua* [ancestral family guardians] came down and just circled them, and circled them constantly. My grandmother said "That owl is trying to tell us something, let's climb the tree and see if we can see anything." So they climbed up on the tree, and no sooner had they gotten into the tree and the wild bull came and killed my grandmother's horse.

KM: 'Auwē!

TR-S: And so, they were very, very fortunate.

KM: 'Ae. So this was up on...?

TR-S: On Mauna Kea.

KM: Humu'ula vicinity?

TR-S: I'm not sure, but it was on the mountain. And grandpa was going after wild bulls. And you know, they believed and it was true. These *'aumākua* were there to take care of them.

KM: Yes...

...Did you hear, was your grandfather involved in the road crews, construction of the road in between Pu'u Wa'awa'a and Waimea?

JK: I haven't heard anything.

TR-S: I don't really know. He told me though, "Of all the ranches on this side, Hu'ehu'e Ranch was the most beautiful. They had the lands." He said, "That is the most beautiful ranch." And of course, he spent a lot of time there, because his sister was married to Maguire.

KM: And that was Eliza?

TR-S: Eliza.

KM: It's quite amazing how all of these ranching families intertwine, all the connections.

TR-S: Exactly.

KM: Woods, Parker, Maguire...

TR-S: Yes, it was all tied in with Parker.

JK: Ka'au'a.

TR-S: All descendants.

KM: It is a far reaching history.

TR-S: And when my mother was young and going to Punahou school, the family lived in Honolulu and she used to come up with Sunty Muriel Shingle, when Auntie Abbey was married to Parker. They would come up by boat and get off at Laupāhoehoe, and then they would ride from Laupāhoehoe to Mānā.

KM: Hmm.

TR-S: And that's why they stayed so long, because it was such a long ride. But she said, "It was absolutely beautiful."

KM: So the Laupāhoehoe, Hilo landing?

TR-S: Yes.

KM: I wonder if they rode *makai*, along what is basically now the government road, or if they went *mauka*...?

TR-S: I think they went *mauka*. From Laupāhoehoe up, and around Hānaipoe and on to Mānā.

JK: Right.

KM: Hmm.

TR-S: The young ones rode on horseback, and the older generation had carriages.

KM: Do you have an idea of when this was, about?

TR-S: [thinking] I don't know.

KM: About when was your mother born?

JK: [looking in the family Bible] Eighteen-ninety.

KM: Okay. Johnny Ah San mentioned some trails there; I wonder if it was the Laupāhoehoe-Waipunalei Trail, or if they went up the 'O'ōkala Trail, or the Kūka'iau-'Umikoa Trail; and cut around the Keanakolu-Mānā Road?

TR-S: That, I really couldn't tell you. But I know that they went *mauka* from Laupāhoehoe.

KM: And it was carriage accessible?

TR-S: Yes, they had that for the older people.

KM: Hmm...

TR-S: ...Where is Pu'u 'Ō'ō?

KM: [pointing to locations on map] Pu'u 'Ō'ō is here, and the Shipman Ranch.

TR-S: Yes, I went with Uncle Herbert, and we rode all through the orchards there. It was just beautiful! Just beautiful!

KM: Yes. And earlier, you mentioned Pua 'Ākala. This is Laumai'a, and then you come into Pua 'Ākala, then Hopuwai.

TR-S: Yes.

KM: Johnny Ah San said that the Territorial Forestry program set up a series of cabins about every six miles apart along the way, so that people traveling or hunting on the mountain had a place to stay.

JK: Sure.

KM: Like here, you arrive at Keanakolu, the Parker Ranch house.

TR-S: Yes.

KM: When we went with Johnny Ah San, he pointed out the old ranch house foundation. The house has since burned down.

TR-S: Uh-hmm.

KM: But he said, that right by the ranch house foundation, was a sheep pen or sheering area, and the *pu'u waiū*—the forked post that they used to reel in the wild *pipi*—is where your grandfather lost his left hand.

TR-S: Hmm. If I recall, it was in 1892, when grandpa lost his hand.
[The year 1892 was confirmed while reviewing excerpts from Eben Low's diaries. Eben Low also documented that he and his co-workers had been rounding up wild steer at Hopuwai, driving them to Keanakolu just prior to the accident.]

JK: Oh, see I never knew the exact area.

KM: Yes. Johnny Ah San remembers your mother, Annabelle, quite fondly.

TR-S: [smiling] She was a character.

KM: Johnny said that Willie Kaniho was always very protective of that particular feature, and Johnny feels that it is an important historical point on the mountain, as well.

TR-S: Uh-hmm.

KM: He also said he thought it was made of *māmane* wood.

JK: Is it still there?

KM: He believes that it is still there. It was there in the 1960s when he was working on the mountain. Fortunately, the day the we went on the mountain we had a beautiful trip, and his memory is so good. We went right to Keanakolu. He said “Walk right over that rise and you’ll find the three caves for Keanakolu.” And he pointed out the ranch house and area of the *pu’u waiū*, but it was raining, and we didn’t want to take a chance of him catching a cold.

TR-S: Sure.

KM: So my thought was, that sometime we could try to go *holoholo* with some of the families and try to locate that.

JK: I’d love to.

TR-S: That would be wonderful!

JK: [looking at the map] Where is Kanakaleonui?

KM: Kanakaleonui is here.

JK: Hmm. I know in talking with Kindy Sproat, that was a part of that area where they were doing a lot of ranching activity.

KM: Yes.

JK: It would be interesting to go back there and see if we could find the *pu’u waiū*.

KM: Yes. Another thing that I’m really curious about too, in coming back to your family’s own relationship and desire to have their ashes on the mountain, is that...this isn’t a new phenomena?

TR-S: Oh no.

KM: It is something that has been handed down for generations and generations. There are burials on the mountain.

TR-S: Uh-hmm.

KM: Have you perhaps, or do you recall perhaps hearing anyone talk about burials?

TR-S: Just in the general sense, that there are people buried up there [pointing to location on the map].

KM: This Kanakaleonui, Kaupō, Mākanaka vicinity?

TR-S: Yes.

KM: There are several areas on this side particularly.

TR-S: Yes.

KM: And there is also discussion that in the summit area as well, that there are...

TR-S: Actual burials?

KM: Yes.

TR-S: I wouldn't be surprised...

JK: ..I will also look for the writings from Great Grandfather Low. He was so insightful and so in tune. Just reading how he wrote, to see someone who was involved in ranching, but yet knew of the destruction it was causing to his native land. So you could see where, as he was writing, that he was torn. That was his business, cattle ranching on Mauna Kea.

KM: Hmm.

JK: Yet, he could see the destruction of the *koa* forest and the *kaui*la, the *'ōhi'a*, and *māmane*. So I'll try to find that for you because I think you will find it very helpful, and getting into the mind set of great grandpa.

KM: Thank you.

JK: Just by looking at the photos and reading his writings, the man was just phenomenal in his... Like I said, he went everywhere. There were no limitations. He lost his, no problem.

KM: Was he fairly young when that happened?

JK: Yes, I believe he was in his twenties, if I'm not mistaken.

KM: Hmm.

JK: And in these writings, he also talks of Purdy, Lindsey, and the different stories of them chasing down the *pipi 'āhiu* [wild cattle], and it's really interesting. He talks about the strength and character of these men and their differences. And he talks about how fearless they were to go into these places that were just so thick. Really, for you, for the Mauna Kea information, it will be invaluable. So I will find that.

KM: *Mahalo*.

JK: My great grandfather was a pretty heavy man, involved in so many different things. But no, as far as the mountain, I can only guess, because I didn't know him. He died before I was born. I have always been interested in history and our family's past, and to me, there is a connection because I love the land and the ocean. But in my interpretations, I believe that that man was probably more in tune with nature and Mauna Kea. And being part Hawaiian, though he was mostly *haole*, but he was so in tune with nature. Whether it was on the Hawaiian side or whether it was politics, he just knew. He was a sharp man. In those writings that I will get to you, you really realize how in tune he was with this mountain and nature, and what was happening then. And some of this was in the 1800s, and he knew.

Today, we're going, "Gee, the forest is getting wiped out..." And you look up the mountain here, and you know that at one time, that forest came down a lot further before they cut and grazed. Yet, he was saying it in the 1800s.

KM: Yes, it is amazing.

JK: To me, that was really heavy when I read that. And to me, I just try to learn from that, what can I do today?

KM: Yes, it's amazing. I really appreciate what you are saying about how we interpret history. We weren't there, so we need to acknowledge that this is how we interpret what has been handed down. That's important.

JK: It is...

**Albert Kahiwhiwaokalani Haa, Sr.²⁴ (AKH)
and Albert K. Haa Jr. (AH)
Oral History Interview with Kepā Maly
November 10, 1998**

Albert Kahiwhiwaokalani Haa Sr., was born at Kapoho, Puna, in 1930, and raised at Kea‘au. His father’s family had worked for the Shipman family almost since the Shipman’s arrival in Hawai‘i in the 1850s. Living at Kea‘au, members of the Haa family worked the lands of the Shipman Ranch, including Kea‘au, Keauhou, and the Pu‘u ‘Ō‘ō-Pua ‘Ākala vicinity. Mr. Haa’s great grandfather was the often spoken of “loane.”

loane was a close friend and steady companion of Willie Shipman, Eben Low, and many families who had ties to activities on Mauna Kea and the surrounding lands. loane was known as a healer, and by all accounts, he was very knowledgeable of sites, practices, and customs associated with the mountain lands. loane traveled all across the mountain, and some of the old families still call one of the trails—running from the Hānaipoe side of Mauna Kea, around the Keanakolu side, and up to the summit—“loane’s Trail.”

During his youth and teen years, Mr. Haa spent quite a bit of time on the mountain ranch lands, and it was in those years that he heard some of the old people speaking about Mauna Kea, and learning about some of the customs and practices of old. When speaking about *heiau* and other Hawaiian sites, and customs, Mr. Haa noted that these old things were “precious” to his father and the older family members, and to protect them, they didn’t often say much about them. So in that way, many things were lost.

During the interview, the elder Mr. Haa was joined by his son Albert K. Haa Jr. The younger Albert Haa was born in 1953, and was raised by his *tūtū* (Edward Haa). As a result, he learned some of the traditions and practices that his father had not been instructed in. Together, father and son shared some of their family history and thoughts about the mountain lands.

Following review and making requested modifications and additions to the interview, Mr. Haa gave his written release (and the verbal release of his son), for the interview on November 25, 1998.

KM: *Aloha.*

AKH: *Aloha.*

KM: Mr. Haa, could you please share with me your full name?

AKH: Albert Kahiwhiwaokalani Haa Sr.

KM: ‘Ae, Kahiwhiwaokalani, a beautiful name. When were you born?

AKH: July 16, 1930.

KM: Okay. Where were you born?

AKH: Kapoho.

KM: Oh, what area?

AKH: In the railroad station.

²⁴ At the family’s request the name is written “Haa,” as Mr. Haa’s *makua* and *kupuna* wrote it, without any of the modern diacritical marks. While written “Haa,” it is noted here, that both of the letters “a” are pronounced (pers comm. November 19, 1998).

KM: Oh! Who was your papa?
AKH: Edward Haa.
KM: And your mama?
AKH: Hilda Kahana Haa.
KM: Okay. Was papa working out at the Kapoho area at that time?
AKH: No, he was working at Kea'au.
KM: At Kea'au. Was he working with Mr. Shipman?
AKH: Yes.
KM: So your papa was Edward, also called Eddie, is that right?
AKH: Yes.
KM: What did he do for the Shipman family?
AKH: Cowboy.
KM: Was he down at Kea'au, cowboy, or was he also on Mauna Kea?
AKH: Kea'au and Mauna Kea.
KM: Both sides eh?
AKH: Uh-hmm.
KM: Were you raised at Kea'au?
AKH: I was raised at Kea'au...
KM: ...When you would go *holoholo* [to the mountain ranch lands], did you hear your *kūkū* [grandpa] or anyone talk about *heiau*?
AKH: Well, my father tells us, but he didn't tell me the location. Like I told you [prior to the recorded interview], the special, important things, he didn't say too much.
KM: 'Ae.
AKH: To them, it's a secret that goes with them.
KM: 'Ae. So these special things, as you said, they cherished them...?
AKH: Yes, they won't talk about it.
KM: Oh. The thing that is hard today, is that the land is being changed so much.
AKH: Yes.
KM: And because *kūkū mā* [the grand folks] some times didn't share the stories, things get destroyed now.
AKH: Yes.
KM: And that's really sad now, *kaumaha*.
AKH: Yes...
KM: ...Was it your papa that was Herbert's driver?
AKH: Was my Uncle Henry. My father's brother.
KM: And loane was your *tūtū*?
AKH: My great grandfather.

KM: Oh... Earlier, we were talking about Mauna Kea. Did you spend some time up on Mauna Kea?

AKH: Mauna Kea, I used to go with my dad. But you know, I don't talk Hawaiian eh.

KM: Hmm.

AKH: When I was growing up, my father told my mother...I remember this. "Don't talk Hawaiian to that boy. Don't teach the Hawaiian to him. I don't want him to learn Hawaiian..." And that was because he didn't want me to know what they were talking about.

KM: Ohh!

AKH: So I never did learn. But I hear from others, you know?

KM: 'Ae.

AKH: The cowboys, they talk broken Hawaiian. They mix Hawaiian with Filipino, Japanese, Portuguese, and everything else. So I understand some, but my father he didn't want me to speak.

KM: So he didn't want you to know how?

AKH: Yes.

KM: So when you were on Mauna Kea...

[Albert Jr. comes to the door]

AKH: Oh, there's my son...

KM: ...So we're just talking a little bit about Mauna Kea. Also, did you know Johnny Ah San?

AH: I heard the name.

KM: He's 91 years old now. And he and Toshi Imoto... [speaking to Mr. Haa Sr.] You remember him yeah?

AKH: Uh-hmm.

KM: Toshi Imoto was born at Pu'u 'Ō'ō. And Eben Low's *'ohana*, Pete L'Orange them, all talk with great *aloha* for your *kūkū* loane. And everyone says that he really knew the mountain. He went all over Mauna Kea. He gathered *lā'au* [medicine] and things like that. Did you folks hear any stories about him?

AH: Oh plenty, plenty.

AKH: Are we going to go up to the mountain?

KM: We can go some time. Maybe not today, but I've been talking with Uncle Sonny, Uncle Danny, Uncle Teddy Bell them, and Papa Johnny Ah San, we were thinking of trying to make an excursion where we all go *holoholo* just to look at some places and talk story, like that.

AH: They were talking about that maybe two or three years ago. They wanted to go across my Tūtū's trail. Just to go across it, and they had mentioned that to my sister, and she mentioned it to me, if we were interested.

KM: Hmm... Now your papa told me that you that you lived with your *kūkū*, Edward Haa?

AH: Yes.

KM: So you were learning from him, stories about your family. You were their *hānai* eh?

AH: More than stories, I saw things that my grandpa did. And to me, you're talking about the *kūpuna*, it's beyond the *kūpuna*. That's Akua's *kuleana*, up there.

KM: Hmm, Mauna Kea?

AH: Yes . That's why everything is sacred. I asked Sonny, he tells me, that his father told him, "Everything about loane is secret, they don't bother. What he did up there, was protecting *Akua*."

KM: Hmm.

AH: And grandpa them, everything is with God. And that's why there is this great secrecy thing. It's to protect our religion. When the white man made it *kapu*, grandpa guys hide. But they continued doing *kahuna lapa'au*, *kahuna pule*, and those kinds of things. They would have gone to jail if people knew what they were doing.

KM: That's right. [Shortly after the arrival of the Calvinist missionaries, many native practices were banned and penalties for their practice included imprisonment (cf. Kamakau 1961).]

AH: But my grandpa continued to practice. That's the part we get scared about. I don't think that that is to share with everybody.

KM: 'Ae.

AH: See some people, only think about money, and they are looking at the power. The power of healing has always been a problem of jealousy from family to family. Who is more strong than who?

KM: Hmm.

AH: And to me, some of the stuff *Tūtū* guys do, the world is not ready for that. You know what I mean?

KM: Uh-hmm.

AH: The Christians, they get Bible, but they no can believe their own Bible. That's why has all different kind religions now. So how are they going believe one old Hawaiian man when he tell them something? So plenty stuff is all *kapu*. That's just not for everybody. But as far as they're calling by great grandfather one rustler, how can it be rustling? Those days, they killed you for rustling. And all that mountain, that's stray animals that, no more fence nothing.

KM: Hmm, back in your great *kūkū*'s time?

AH: Right. We have some stories, where he would just raise his hand and the *pipi* [cattle] would all come to *Tūtū*. That's how they separate the cows before Parker Ranch was even branding cows. Then all of the sudden, they turn around and make that kind story. I was kind of upset, you know.

KM: Yes.

AH: I know him, he would go get the *pipi* and give to all kinds of people, families who needed it.

KM: Hmm, so he was out taking care of the people.

AH: Right. But I guess they try to make the story in their own, like he was the Robin Hood of the mountain, he was stealing to go feed the hungry people. He wasn't stealing, who originally owned all that land? Not the white man. Who made the boundaries? They never had boundaries up there. That was all open cattle that. And if he was guilty, they would have hung him, because that was the law at that time. I never liked the idea that they've got that on top of my Tutu's picture [referring to a photograph hanging in Cook's Discovery Gallery in Waimea]. "Rustler!" That's a dirty name!

KM: Hmm. All of the old people I spoke with, they speak with so much *aloha* for your *kūkū* loane. And when I finish this study for Mauna Kea, you'll see all the stories. Johnny Ah San, shared a story about what he heard from the old timers about what really happened.

And people like Eben Low's granddaughter them say that their *tūtū* had so much *aloha* for your *kūkū* loane.

AH: With Eddie Kamae them, I met some of the old Japanese cowboys from Parker Ranch, they were telling me some stories from when they were little kids. My *tūtū* used bring apples, plums, and all kinds of stuff from the mountains [the old Keanakolu orchards] and pack 'em all in little bags and give 'em all to the little kids, when he would come off of the mountain. I never heard too much bad stuff, only recently. So when I see that "Great Rustler," that kind of hurt me. I never go in there yet, because I don't know what I would do.

KM: Yes. Well, by this story here, we can help fix some of that... ..What do you feel about the caves and the old trails...? [pointing to locations on HTS Plat 613] I know it's hard to get bearing on a map, but this is where Hale Pōhaku is, here, be Pu'u Lepeamoā. Here's Humu'ula Sheep Station. This is Pu'u 'Ō'ō, where your papa them were when he was young.

AKH: He hasn't been there yet.

KM: Okay. We will go some time. Here's Laumai'a, another one of the old camps. This is Pua 'Ākala, where your *tūtū* them used to stay also. Hopuwai. And here's the Keanakolu cabin here. Now you mentioned loane's Trail, your *kūkū*'s trail.

AH: Uh-hmm.

KM: Do you have an idea of where...in fact, this is the trail that comes from Hale Pōhaku, the old Mauna Kea-Humu'ula trail to the mountain, to Waiau. Do you know where loane's Trail is?

AH: It is supposed to come from Pihā *mauka* side and Mānā Road.

AKH: Laupāhoehoe side.

KM: Was your *kūkū* born Laupāhoehoe side?

AKH: Maui.

KM: Ahh.

AH: loane's Trail passes through Āhualoa.

KM: So his trail comes from that side.

AH: And Mānā Road, but I presume they all join together. He used to go all over.

KM: Yes, you're right, many of the trails intersect and come together. So from Mānā Road, Hānaipoe, and around the mountain, and comes up here to what they call 'Umikoa Trail...

AKH: Yes.

KM: And it comes right up here to the *piko* [summit], here by Pu'u Poli'ahu. So the trail from around that side is what you think is loane Trail?

AH: I think that is the one that Sonny guys are talking about.

AKH: That's it.

KM: And they said that this was the old trail that their papa them would use also.

AH: See, they followed the trail afterwards. That trail, he used to bring the *pipi* over the mountain, over Mauna Kea to Mauna Loa, and come out by Hirano Store in Glenwood. That's where the train used to pick 'em up.

KM: Oh okay... Also, did you hear, were there *heiau* or something on top of the mountain? Did *kūkū* go up there to *pule* [pray or worship]?

AH: Supposed to be, the mountain and the ocean are connected. I know of people, you know the kind crazy haoles come over here. One of them told me, he went fool around. They went walk 33 miles. And he came to one cave that had the kind big square stones, like what they made the pyramids. He said had four big stones like that. And from there, he came back. The *haole* guy caught the plane. He said, he's "never coming back fooling around with this again."

KM: That was *mauka*?

AH: That was *mauka*. Supposed to get three big caves going up there. But everybody stay *maha'oi* [intruding – being nosy] in one already.

KM: That no good eh?

AH: Just leave 'em alone...

**Radcliffe “Rally” and Patricia Gilman-Greenwell
Oral History Interview with Kepā Maly
September 22nd, 2000; March 9th, 2002 and December 30th, 2004**

The late, Radcliffe Greenwell (affectionately called “Rally”) was born at Honokōhau in 1913. The second of three sons, born to Frank R. “Palani” and Evelyn Greenwell. Rally was raised on the Honokōhau (Palani) Ranch lands, and followed the life of a Hawaiian cowboy—in which knowledge of the land, people, livestock, and their relationships—was the way of life. He has carried those lessons learned in his early years with him throughout his life. In 1934, Rally began working for Parker Ranch. After six months on the ranch, he was placed in charge of the Ke’āmoku section, and later worked on all sections of the ranch, including Humu’ula, Mauna Kea, Pā’auhau, Waiki’i, the North Kohala lands, and Kahuku in Ka’ū. In between 1944 to 1955, Rally worked for Kahuā Ranch. On January 1st 1956, he returned to Parker Ranch as the foreman of the Pā’auhau Section. In 1961, he was named the Administrative Assistant to Richard Penahallow, and in 1963 he was made manager of the ranch, a position he held until he left the ranch on June 3, 1971.

Patricia “Pat” Gilman-Greenwell, was born on O’ahu in 1924, and like her husband, she is descended from families with generations of residency in the islands. Pat and Rally married in 1947, and since then they have shared a life-long partnership upon the land and in events that have become a part of the history of ranching. Pat herself, has a passion for history, and has spent countless hours in the field with elder *kama’āina*, visiting places and learning of past events. She has also spent a great deal of time reviewing historical narratives, and collecting information of interest along the way. At times in the interviews, she shares important observations about ranch life and activities from a woman’s perspective, sometimes filling in details that otherwise go unobserved.

RG: ...I think that Parker Ranch, not running them down, and not because I worked there. They really had a good system of moving cattle and whatnot. You take the Humu’ula land, that big area up there.

KM: Yes.

RG: They’d wean the calves and all the heifers... Are you interested in this?

KM: Absolutely.

RG: Or am I just taking up time?

KM: No, I’m pulling out a map. What I have is, I am just pulling out a map, I wanted to get us in line of just where you’re talking about. Here’s the Pōhakuloa Shack, the old forestry shack and stuff in here. Here’s Humu’ula Sheep Station, okay. Just wanted to get us in line, kind of where we were. So you were saying, Humu’ula, and again, that Parker Ranch had a good system of...?

RG: Yes, but in the olden days, they never moved cattle from Humu’ula, that’s Kalai’eha, what I’m calling Humu’ula, Kalai’eha to Waiki’i. They always used to go around Keanakolu side.

KM: They would?

RG: Start at Pā’auhau...

KM: So in reality, this sort of, more Pōhakuloa flats area like that?

RG: Nothing...

RG: The cattle, here again, resting paddocks. There’s a big area down at Pā’auhau, and they’d raise calves all through here, and then they’d wean the calves, and all the heifer calves would go down to Pā’auhau. They would stay there until they became yearlings. When they were yearlings, they were driven from Pā’auhau up to Hānaipoe.

KM: 'Ae.

RG: Maybe a thousand or twelve-hundred at a crack.

KM: Wow! Here's your Pā'auhau Paddock area?

RG: Yes.

KM: Here, this is HTS Plat 613, Mauna Kea and the Forest Reserve Lands. I'm assuming you're talking about these big fenced paddocks here?

RG: That's right. Where's Hānaipoe?

KM: Hānaipoe...here's Hānaipoe Camp and Paddock right there.

RG: Okay, these cattle from Pā'auhau, yearling heifers, would be driven to Hānaipoe, and then next day, very early, you take these cattle to Keanakolu.

KM: You come all the way around? Here's Keanakolu Cabin here.

RG: So, in the meantime, the year before, you've done the same thing, taking cattle up here. Now, these have grown out.

KM: At Keanakolu or Humu'ula, Kalai'eha?

RG: All through here, Keanakolu right through Kalai'eha. Those are all heifers. You take these yearlings up and you'd have a different crew, the Humu'ula crew that picks up a thousand or twelve-hundred, two year old heifers. Bring 'um to Keanakolu and then you'd come down, this gang would meet this gang, and you'd switch. This Humu'ula gang would take this bunch of cattle up to Keanakolu.

KM: Wow!

RG: And the Waimea gang would take these down. So these are two year olds coming down. They get down to Makahālau and then they were separated. All the good ones were saved for breeding, all the junk ones were sent to Honolulu. They were fattened up there.

KM: This whole area, Kalai'eha, Humu'ula, Keanakolu, was all good fattening lands also?

RG: For heifers, yeah. And another thing, they were fairly safe from bulls, so they wouldn't get *hāpai*. This was all mountain country, no bulls, forest, no bulls.

KM: You folks maintained fence lines through here all the time right? As a part of keeping the cattle out of the forests?

RG: Most of it, yes. Except where they touched Shipman's land of Pu'u 'Ō'ō. Then it was a fifty-fifty deal. But all state (Territory) lands.

KM: Yes, *mauka* fence?

RG: Yes.

PG: When the cattle came from this side, it was early in the morning when they met. Perhaps about what time, Rally?

RG: About daylight.

PG: He told me, he said, it's too bad, it would be nice if you could go up there and see. Because when the cattle come together and the herds pass, they don't mix up, the men were that good. They said, it is so beautiful because there's a water hole there, Rally?

RG: At Keanakolu, yes.

PG: Remember telling me that?

RG: I remember telling you, but not the passing, the nice spot was at Keanakolu, the afternoon before we started these cattle down. We'd bring them into the big waterhole, and they would go in and swim in there and drink water and what not.

PG: And as a cattleman, he said, it was the most beautiful, beautiful site. Wasn't that what you were telling me?

RG: Yes.

KM: The men, the cowboys, had some real skill and talent in keeping these two separate herds separate and passing. This was all that dirt trail basically?

RG: Yes.

KM: Did Parker Ranch put that trail in, do you know or was it older?

RG: As far as I know, it was there way before that.

KM: Way before?

PG: Bill Bryan told me way back in early '50s [thinking], anyway in the '50's, that it was German's who built the log cabin up there (Waipunalei).

KM: Haneberg?

PG: He said that he thinks that, they're the one's who put that cobblestone road from the log cabin area.

KM: Yes.

PG: And you can see parts of it.

KM: That comes back towards Pua'ākala?

PG: Towards Waimea.

KM: Okay, from Keanakolu cabin? Is that right, you're talking about Keanakolu cabin?

PG: Rally?

RG: Yes. You're talking about the stone?

KM: Yes, filled?

RG: Yes, above Keanakolu.

PG: The paving, the road paved with paving stones.

RG: Yes, above Keanakolu.

PG: Yes, comes down on the curve.

RG: Going to the Doctor's Pit.

KM: That's right, so it is going back towards the Doctor's Pit (Kaluakauka)?

RG: Yes.

KM: Yes, I know which one you're talking about as you said, you can still see some evidence of that stone paving there?

PG: But then, where is it? Waipunalei, where the Filipino used to stand up on his tippy toes to shout up into the telephone, you told me?

RG: Yes.

PG: Alright.

KM: Here's Waipunalei.

PG: Is that Waipunalei?

RG: Yes.

PG: Alright, but from Waipunalei coming towards Waimea, it goes past the big eucalyptus grove or big tree grove, there's a curve. I saw those paving stones there coming down.

RG: Yes.

PG: But anyway, Bill Bryan thinks, he was not one hundred percent positive, but he said, "I'm pretty sure that the German's did that for their wagons."

KM: Yes. It's interesting because Hitchcock them were there earlier, they had Pua'ākala, and in fact, if we think about it for a moment. You mentioned Doctor's Pit, Kaluakauka?

RG: Yes.

KM: A little between Kaluakauka, just a short distance from there before Keanakolu Cabin, though. There's a hill and there's some old stone enclosures, the caves, do you know?

RG: Yes, but what I have in mind is that, that's directly *mauka* of the doctor's pit.

KM: Yes, you're right, almost directly *mauka*.

RG: The old road is between the doctor's pit and there?

KM: Did you hear about...were those old cabins? I was wondering, if those were Hitchcock's? They were hunting bullocks and stuff, I think in the 1850s?

RG: I've always understood that, that area where those stone corrals are, that was the original Keanakolu.

KM: Okay.

RG: And later, they called this, where the log cabin is, Keanakolu.

KM: That's right. That log cabin was Parker Ranch cabin right? Wasn't there a *koa* cabin or something, or was that somebody else's?

PG: There's *koa* logs, that massive big cabin is made with *koa* logs and when Bill Bryan took me into it, it was lined with white canvas. He said after the Germans went out, it was turned into a slaughter house.

KM: Oh. Do you remember...Because that cabin is burned down now.

RG: I remember what they called the cabin, was made of old logs. I always understood that, that was put up by the CCC people.

KM: Okay see, there is the older one though, where Eben Low lost his hand, the *hāmana*...

RG: Where there's the corral and shearing shed?

KM: Yes, that's the one that's burned down.

RG: That one burned down?

KM: Yes.

RG: The old forest reserve...?

KM: Is still there. The CCC one, now that's another interesting thing.

PG: That's the modern one?

KM: Yes.

PG: That's got lumber on it?

KM: About 1930s.

PG: That's not made out of logs, Rally.

KM: No, no. But the old cabin, I think, had some *koa* and stuff in it. You're right, Haneberg was the German guy. They had one of the early leases from the Crown on Kalai'eha, Humu'ula. You know when you come from Kalai'eha, Humu'ula cabins, the station?

RG: Yes...

KM: ...But I do want to come back to the paved trail or the paved road for a moment. Because, and you'd mentioned CCC, we went up with Johnny Ah San. You remember Johnny?

RG: [nodding his head]

KM: We went up with him about...?

PG: When did you go?

KM: Just about two years now.

PG: Oh.

KM: Two years ago, we went up, we went along, you could see definite places where Parker Ranch, later I guess, adjusted the road in between Kalai'eha and Pua'ākala like that. You can see where the old alignment was, and then where the more recent alignment, just straightening it out and making it better, yeah?

RG: Yes.

KM: Well, CCC also did some paving, some stone work, and it was primarily, what I understand, was because in those areas, where you were going up a slight rise, if it's all dirt and stuff, wet...hard?

PG: Hard for wagons.

KM: Hard for wagons, for vehicles. Some beautiful areas where you could see the stones paved in there. But, you remember Bill Bryan talking to you about that period?

PG: Yes.

KM: That's a really interesting thing about those corrals in there. There's actually some that are real small, they look like they were small house shelters up in that area. Above Kaluakauka.

RG: Yes.

KM: But your recollection was that, that's really the original Keanakolu?

RG: This is my understanding, and the reason they call it Keanakolu was because there were three caves or something around there.

KM: That's right. Have you been into the caves, have you seen it?

RG: I don't go into caves, I walk around.

PG: No, I've looked for 'um but I've never been able to find 'um. I've looked and looked, I've hiked around twice there and I couldn't find 'um.

KM: If you guys want to go *holoholo* sometime, we should go *holoholo*.

RG: No, I told you, I don't go in caves [smiling].

KM: No, we don't need go to the caves [chuckling]. I'll take you up to it...

PG: The bullock hunters lived up there, so maybe that's why...

KM: That's right.

PG: You know where the caves are?

KM: Yes.

PG: Boy, I'd love to see those!

KM: Johnny took us right to them, Johnny Ah San. I tell you at, he was 91 when he and I went *mauka*...sharp like firecracker, the *pepeiao* little bit *kuli*, but I tell you.

PG: Wonderful, you were able to talk with him!

KM: We would just start to go around a bend in the...the reason I'm asking you. Do you remember hearing about the Laumai'a Road or Laumai'a Trail? It appears that we have this mish-mash of traditional where the old Hawaiians would come *mauka* of the forest edge. Because it was easier to travel?

PG: Yes.

KM: And it cut the distance, you know. Later, when the ranch came in and as things were modified like that. Then through the CCC, we have these three or four different sections of trail to road that you can find there.

PG: That's why Douglas was *mauka* there, he was taking the short way.

KM: That's right, he was picking the short way, exactly. It's real intriguing, I'll tell you we'll get around here. We'd just start coming around the bend in a little bit and oh, Johnny would say, "You'll see where the old section of the road is." Sure enough, you come and there's the old road. You get to Pua'ākala, he'd show and right there, there's the old road. You look down you can see the edge of the old road, right there where the paving was.

RG: Yes.

KM: We should go, if you like, we go *holoholo*?

RG: Old Johnny, he should know, he spent all his life up there.

KM: Yes, that's right, it's amazing!

PG: Gosh, that would be interesting. My son is a good mechanic, we can take two cars in case because you don't want to get stranded up there. You know David...don't you think David would be interested in this?

RG: No [chuckling].

PG: He's very interested in...

RG: You can ask him [chuckling].

KM: Sure, that will be good fun, we should try to go *holoholo* sometime. Maybe Jimmy would like to go too, just to go cruising. He enjoys your company, you know.

RG: You know Kepā, it's been so long since I've been around there, I've forgotten.

PG: Yes, but that's good, it would refresh your memory.

KM: That's the thing too, let's come back to here for a moment. I'm curious if you, all I'm doing is asking a question, if you've heard it, yes or no. The gorse that we spoke about when we met last time also. Did you ever hear a story maybe, about how that gorse was brought in?

RG: [thinking] No. I've heard in later years, that it might have come in with sheep, in the sheep's wool, they had imported sheep from Australia or New Zealand. Somewhere down there. And it was thought that maybe the seed came in, in the sheep's wool when they brought it. The first gorse that I ever heard of, or saw, was down on the lava. You know where Pu'u Huluhulu is?

KM: Yes.

RG: Down on that road, going down towards Hilo someplace...

KM: Prior, or in around that time though, you had already been up to Kalai'eha?

RG: That's right.

KM: And you'd been all the way around Keanakolu, back to Hānaipoe and back out. You never saw gorse?

RG: There was no gorse.

KM: Wow, that's amazing!

RG: And then the gorse came into Humu'ula and we started getting after it.

KM: About when? You think, roughly?

RG: I think when I was at Kahuā, probably.

KM: Wow!

RG: In the late '40s or somewhere around there. When I came back in '56, they were working on it and it was under control, they'd go out with spray pumps.

KM: There was a regular management program going on by the mid-fifties?

PG: Weed control.

RG: Yes, definitely. And I'm pretty sure, and this you don't have to quote me on it, but when I left the ranch in '71, I think that there was nothing more done with eradicating the gorse.

KM: Yes, the same thing has been told to me by other people.

RG: That's when the gorse came in, and they haven't done anything as far as I know, until recently. When I understand that, that lease is going to be *pau*.

KM: That's correct, yeah...Hawaiian Homes.

RG: I've told you before that when that lease was done, it said that it would have to be returned in as good a shape as they'd got it, or better.

KM: Yes, that's right.

RG: And now they find that the thing is all covered with gorse, and I think Parker Ranch is going to be in real trouble.

KM: If the State holds anyone accountable, but they don't have a history of doing that.

PG: I'm sure it's in all the government leases, and that is one sign of cattlemen, Kepā, to *nānā* and cherish the *'āina*.

KM: Yes.

PG: You don't go in and just use it.

KM: *Hana 'ino*.

PG: You take care of all your lands, especially when they belong to somebody else and you're leasing them.

KM: Yes... ..When you started for the ranch, about how many people would you say, were working here?

RG: When I started?

KM: Yes.

RG: This is a guess, probably 150, maybe, because we had a dairy and there were probably 20 people in the dairy (Pu'u Kikoni).

KM: The dairy was going up towards Makahālau?

RG: Yes. There were about twenty people there. They had the Makahālau Station where they had the registered cattle, probably about ten people there, scattered all around.

KM: The Waiki'i area like that ?

RG: Waiki'i probably had about forty.

KM: Wow! What was starting salary in the '30s?

RG: I started at \$75.00 a month, and the others, I think, got about \$45.00, the low pay...

KM: ...Did you ever go up the back side of Makahālau up to Kemole like that, and up over towards the Pu'u Lā'au and up slope? You never went up to the top of Mauna Kea from this side?

RG: You see the ridge line up there?

KM: Yes.

RG: Can you see a tree plot? Kind of a square, just above the hill?

KM: Yes.

RG: That's the boundary between Parker Ranch and the Forest Reserve. You take a line from there and you come across about the middle here, you can see a hill?

KM: Yes.

RG: The cloud right over it? The fence from that tree plot over towards the top of that hill and then across. I went up to that boundary fence, I know all of that area.

KM: Yes.

RG: Above the boundary fence, all in there. But above the boundary fence, no, I never went up there, except on the Humu'ula side.

KM: On the Humu'ula side. And part of the ranch job was, you needed to keep track of that fence?

RG: That's right.

KM: I understand Bill Bryan was a real stickler about it, a pretty wild man, about protection of the forest reserve area?

RG: Right.

KM: It was a regular thing, I guess, when you guys were out. Did you have people that were dedicated to...that was all they did around the mountain, checking out the fence or?

RG: There were sections, Makahālau, Waiki'i and Hānaipoe. Those sections had a section of the fence they had to check. Probably every month, they'd send a guy on horseback, go check their section...

KM: *Mahalo...!*

***Cattle drives between Kalai'eha, Keanakolu and Mānā
March 9th, 2002 with Kepā Maly***

- KM: ...When you talked about driving *pipi*, were you folks still walking them?
- RG: Right.
- KM: What was that route? You would bring the *pipi mauka* here and go over to...?
- RG: Not here, maybe one or two times we went here. But most of those cattle went on the Hānaipoe side.
- KM: So, around Hāmākua, Laumai'a, coming...?
- RG: Yes. There were three, four stations, Keanakolu, Hopuwai, Laumai'a and Kalai'eha. And the best pasture was on the Keanakolu side. But when there was good pasture on this side, you would move them out. And we would take those cattle up as old yearlings, I guess you would call them. We'd wean them from their mother's, take them to Pā'auhau, hold 'em there. These are all heifers, we're talking about. Then they got to be a certain age, then we'd take 'em to Keanakolu, and we might take, oh eight, nine hundred, a thousand head at a crack. And we'd time it, so that the Humu'ula cattle... We'd pick Humu'ula cattle out that grew up there. And they'd stay there until they grew out, and when they came back they'd either go into the breeding herd, if they were good, or the junk one's would be sent to market. The way we worked it, would be one crew would take this bunch of cattle to Keanakolu and they spend the night there, and this Waimea crew take them to Hānaipoe, spend the night there. The next morning, early, I got two crews to start, and you'd meet halfway, maybe through Kūka'iau or someplace like that. You switch...ways, the older gang places.
- KM: So they swap?
- RG: Swap.
- KM: And go back.
- RG: And that was really something to see. When they got to Keanakolu, the big water hole there. You see five, six, seven thousand head of cattle all on...water [chuckling].
- KM: Amazing! And keeping them separate yeah? Making sure that the right group went the right way yeah?
- RG: Yes.
- KM: Now, when you're talking Keanakolu, it's actually the house, yeah, the old *koa*? In that vicinity, or the actual place closer to Kaluakauka, or you know, to the Douglas Pit?
- RG: [thinking] During my time there was, at Keanakolu, there was a forest reserve cabin.
- KM: Right, okay. So, it's the newer Keanakolu Cabin of the CCC.
- RG: And then a little further over there, was Waipunalei house.
- KM: Yes.
- RG: Not too far, and we would stay at Waipunalei, and the corral was right there.
- KM: Right by the forestry area?
- RG: Yes.
- KM: Okay. Because that forestry cabin is still there. Johnny Ah San, and we went up to there, because that was part of Bryan's stuff with the CCC.

RG: You knew Johnny?
KM: Yes.
RG: I told you about the story about him and the horse?
KM: Yes. [chuckling] What can you say...?

***Field Interview on the 'Āina Mauna – Mānā to Kalai'eha
December 30th, 2004 with Kepā Maly***

This interview is one of a series conducted with Rally and Pat Greenwell. It was conducted as a driving tour of the ranch lands encircling Mauna Kea (Mānā through Kalai'eha). In addition to Rally and Pat Greenwell, other primary participants included, Laura Carter-Schuster (niece of Pat Greenwell), and UH-H Archaeologist, Peter Mills.

Participants cited in the transcript by initials include: Rally Greenwell – RG; Pat Greenwell – PG; Laura Carter-Schuster – LC-S; Joe Gilman – JG; Sarah Gilman – SG; Lois Gilman-Schuster – LS; and Peter Mills – PM.

The interview is an important one for anyone interested in historical ranching activities around Mauna Kea. Rally shared detailed recollections of sites and features of the *'āina mauna*; and described the practices and cowboys who participated in the history of the land. The Greenwell's gave their personal release of the interview transcript to Maly on June 4, 2005.

Excerpts from the larger interview focus on the section of the trip from the Hānaipoe and Kūka'iau Ranch lands to the Hakalau section of the forest lands:

LC-S: [Comes up to speak to Rally.] ...We have a historical question about the road, the cobble stones. Are you familiar with that?
RG: My wife will probably have a better story than I will. But I think it was put in because it was so muddy here, and they wanted to get to the dairy, the dairy was in here. The wagons and trucks used to have a hard time to come up here. They were put in before I was around.
LC-S: [chuckling] When was that?
RG: [chuckling] B.C.
LC-S: Because on the Hilo side we have the cobbles up there too, the same kind of pavement, and this same road.
RG: Above Keanakolu?
LC-S: It keeps going around to Hilo side. And I think that was all put in the 1930s, as I understand it.
KM: Not all of it.
LC-S: So earlier than that?
KM: Some of it. Haneberg them put some in.
PG: Yes, to get their wool wagons out.
KM: That's right. Haneberg them improved it. You can even see the records, 1891-92 like that. And then the CCC, when we took Johnny Ah San up, he pointed out where CCC put it in also.

LC-S: Great.

JG: You mean to tell me, in the old days, Parker Ranch was chasing wild cattle out here, and had trees and forest?

PG: Yes! I found the remains of land shells out here.

KM: Amazing!

JG: So this was *ōhi'a* and *koa* forest, and everything?

PG: That's right.

KM: Heavy duty.

JG: So before they had the wild cattle?

LC-S: They also had sandalwood

KM: It was a heavy, heavy forest.

JG: So before they had wild cattle?

PG: And there was another one, Joe Pacheco told me that they used to pick the land shells off the trees as they rode under, a certain tree. Ho... [thinking]

RG: Some of these are stories.

JG: Legends.

RG: When I first saw this [Rally began working for Parker Ranch in 1934], there were one or two *ōhi'a* trees, no thick forest.

LC-S: So Haneberg, where were they doing the wool thing on the mountain?

KM: At Kalai'eha. But Spencer them had initially set it up at Keanakolu, but it was too wet, and they moved it over to Kalai'eha.

JG: It's claimed that the wild cattle trashed the forest.

PG: Yes!

JG: That's an awful lot of forest to trash down.

PG: But there were pigs, and goats and sheep too. And the pigs are very hard on the understory.

JG: Let's say, pre-western discovery, I would think this was forest.

PG: Yes. In the '30s when Joe Pacheco would take Eddie Podmore out riding, he said there was still a lot forest down in here...

RG: ...Next stop Hānaipoe.

Group: [continues drive]

KM: This is old *koa*?

RG: *Koa*, yes.

KM: One lone survivor where the cows can't get it, just on the edge.

RG: There used to be hundreds of wild pigs up here.

KM: Hunting up here, was it strictly ranch or did other people, could any one come in any time they wanted?

RG: No. The ranch kept them out, the ranch boys could come any time they wanted, as long as they let the office know.

KM: That seems to be the way, it was throughout the ranch lands like that. It wasn't just, "this open, free for all?"

RG: That's right.

PM: Is there another road just parallel to use, where that fence is, *mauka*?

RG: I think that's the old fence line.

PM: Sometimes the old road beds get pretty tricky, and hard to find, especially around Keanakolu. There are so many old paths and roads.

RG: Billy Bergin asked me about a stone corral above Doctor's Pit, up in there. I didn't know too much about it, I thought it was used by Kūka'iau Ranch. I thought that they used to put their cattle in there. As far as the Parker Ranch went, I don't think they ever used that corral, they used the corral down by the house.

PM: Kepā has been up there with Johnny Ah San, that same corral. I hope we still might get a chance to go up there today, somewhere close to there, it's such a beautiful site.

KM: It is, isn't it. That's why they were thinking too, that it was older than maybe even the Kūka'iau Ranch time.

RG: Yes, they had Maulua.

KM: Yes earlier, it, Gay?

PM: James Gay.

KM: Had a station over there. It's really interesting and sad that some stuff maybe we're never going to find out.

RG: The land of Waipunalei, as I understand it, was bought by Carter, and the reason he bought it was it was forest land, and there was water down in there. While on the *mauka* land, the Keanakolu land that he had, there was no water and they needed the water for their cattle. That's why he bought Waipunalei. And after he bought it, they built a house there. The fence man and the guy that used to check the cattle and stuff, used to live there.

KM: Do you recall about when he bought that? Do you remember hearing?

RG: No, I don't.

KM: Does around 1904, I think it was before they got Humu'ula.

RG: I think it was just after they got Humu'ula. They wanted the water for their cattle on Humu'ula land.

KM: Okay. That house, was that the *koa* house or was it a tongue and groove?

RG: I think it was tongue and groove. I don't think it ever, I never heard of it as being *koa*.

KM: Okay. The house that burned down?

PM: In the eucalyptus grove up there, yes.

KM: Yes.

PM: I was wondering about that. It's right above Waipunalei Cabins, there's a eucalyptus grove sort of stuck between CCC camp and Waipunalei Cabins. It's more than one house, there's several foundations in there, I understood from what you heard from Johnny, it had burned down in the 1970s.

KM: When we went there, yes.

PM: When I was out there with Sonny Keākealani and Dr. Billy Bergin they said, “No,” they knew about Waipunalei, but had never stayed in those cabins there. So I was wondering if anybody knew a name for that camp, or who was working there?

RG: I certainly don’t know...

Group: [arrives, and stops at Hānaipoe Cabin]

RG: Okay, this is Hānaipoe House. This is the house where we used to bring the cattle up here and put them in the holding pen and spend the night here and the cowboys would spend the night. The next morning take the cattle from here out along the road through Kūka’iau to Keanakolu.

JG: So this was the halfway point?.

RG: Yes, that’s right, this was the halfway.

JG: Before they started ranching up here would this have been *māmane* forest?

RG: Above here it was *māmane* forest, yes. There was thick *māmane* forest, *mauka*.

JG: So what would have been in that little grove of trees back there?

RG: Those old trees out there were *koa*. This is how we used to move the cattle from the other side of the mountain. We had all the good heifers, the heifers we were keeping for breeding, and also the one’s for market. The one’s that were not good for breeding, they were all kept on the other side of the mountain. When we wanted them down here to breed or to market, they would take them to Keanakolu from over there to Keanakolu. Then we’d bring those heifers down here, put them in this little pen here and the next day, take them down by Makahālau, and then around Makahālau, keep them for a little while, and then we’d pick them for breeding purposes or for marketing cattle. And the calves, when we’d wean the calves down there out by Makahālau out, from those big paddocks there, they would all take them down to what we’d call Pā’auhau, the area directly below here. That’s where we pulled them out and when they were big enough to either breed or fatten, we would take them here to Humu’ula and that’s where they would grow out, before they came back here to be bred or slaughtered.

KM: Okay.

RG: Below, along the highway, around Mehau’s place, that was Parker Ranch, and we used to call it Ka’ala.

KM: Ka’ala that’s the land, the name of the *ahupua’a* is Ka’ala.

RG: We had one great big paddock and every time we branded there, it would rain like hell. You would pull the calves up through the mud to the fire. One day, dear Hartwell he brought us, it was getting dark and we were still branding, everybody was as wet as could be. Hartwell brought us ice cream. [chuckling] The boys never forgot that.

Group: [chuckles]

RG: ...There was a fellow by the name of Morifuji, he was the fence man, and also took care of the cattle up here. He kept an eye on all of this area up here. I can remember during World War II, he brought *kiawe* posts in a truck, hauling these posts from Puakō, up here. See, Puakō was owned by Parker Ranch.

KM: Yes.

RG: So he used them as fence posts. They’ve lasted a long time. The only thing that was not good about them is that they were so hard, that it was hard getting the staples in them [chuckles].

Group: [begins drive from Hānaipoe to Keanakolu Cabin]

RG: Now these here, were nice *koa* trees.

KM: Yes, but they are barely hanging on now.

RG: Yes.

KM: The clouds are coming up. See the *pu'u* with the tower or something on top of it?

RG: Is that what they call Pu'u Male? That's above Kūka'iau.

KM: Yes. Not Kihe?

RG: Pu'u Male I think.

KM: I think you're right, I have a map with me. I don't remember that tower, has that been there for a long time, Peter?

PM: I don't know what that is.

RG: I think that's Kūka'iau's water tank.

PM: You know, Dan Miranda, mentioned something about a stone corral, that Kūka'iau Ranch used. But he said that the one up by the Doctor's Pit was a different one.

RG: There is a stone corral between us and Keanakolu, with either one or two big water tanks. It's a different corral than the one above the Doctors Pit.

PM: Do you know if Kūka'iau Ranch used the one that's closer to us, the stone corral that isn't by Doctor's Pit? Do you know if they used that one?

RG: I think they used that one once in a while. The one they used most of all was down low, between Keanakolu and ourselves. I think there are two great big redwood water tanks, this road passes right by it. I think Botelho owns the land around there now.

PM: I know the water tanks, but I never looked around. But that's a good landmark to know where that stone corral will be.

RG: My eye sight is very poor, I don't see anything on the top of the hill.

KM: This one, over there right on the down slope.

RG: Yes. I think that's Kūka'iau's water tank.

KM: Pu'u Male side?

RG: Pu'u Maile [as pronounced].

KM: [commenting on gulch crossing road in the Kūka'iau section] It must have been amazing to see water flowing through here. Did you ever see water come down here?

RG: After a heavy rain I've seen it washed, where it washed some of the road out, but not too much.

PM: The gulch that we just passed through was really deep. Does that have a name?

RG: I don't know, it must have a name but I don't know. Here again, Miranda would know, I'm sure.

KM: I think Hānaipoe has a gulch from the boundary description.

RG: Yes, right over there is a gulch. I think a little further where that tree is.

KM: I guess that Ka'ala land that you folks used to have was a lease? Must have been a lease land?

RG: Lease land.

KM: It was from the Government. Is it still DHHL, Mehau has or?

RG: I think so, yes... Is that the gulch you were talking about?

KM: There was one that was back a little bit farther, this one might be Hānaipoe gulch right here, maybe.

RG: I think so, yes. These are all old fallen down *koa*.

KM: Yes. The seedlings just had no chance.

RG: Yes.

PM: Rally, maybe Kepā's already asked this, but in your life, have you ever come across signs of ancient Hawaiian life up here, or stone tool chipping debris?

RG: No I haven't. The only place I've heard of stone adze is in Kona up in the forest over there.

KM: Above your folks section?

RG: Yes. I can remember my father telling me that he was after a bunch of cattle one time and he ran across these adzes. So he piled them up and figured he would go back and get them later, and then he could never find them after leaving them there.

KM: Honokōhau or Kaumalumalu side?

RG: Honokōhau.

KM: So it wasn't that high up then, was it Pu'u Kapo'ula, the *mauka* section?

RG: *Mauka* side.

KM: But you also went to the adze caves up on Mauna Kea, right?

RG: Yes.

KM: That was later timing in the '30s like that, not growing up?

RG: Yes, in the '30s...

Group: [continues drive towards Keanakolu Cabin]

RG: ...There was a lot of *koa* along Keanakolu, I don't know how it is now.

PM: There's been new *koa* planted in the State Paddock, and it's doing really well.

RG: Hmm.

Group: [Continues drive; arrives at the Kūka'iau Stone Corral. Looks around.]

KM: Here's a stone corral right here.

RG: Yes, stone corral. And the tanks are all in that shed.

KM: In fact you can see they did more roof catchment on top.

RG: Yes.

KM: Kūka'iau, this is their section?

RG: Yes, Kūka'iau. This is where they used to brand, and that's where they got their water tanks, their water shed... Peter, look at the gate hinges.

PM: They are modern, they're not the same kind. They do have the, sort of, post World War II railroad stuff up here.

RG: That's all Kūka'iau, Parker Ranch never had that... Here we're right above Pa'auilo, and Honoka'a would be below Hānaipoe House, where we stopped.

JG: Okay. When they built something like this, were they able to come straight up from *maka'i*?

RG: They came up straight up through Kūka'iau Ranch. Because I know when I was working for Parker Ranch and we had this place, we had roads from this road going down through Kūka'iau. And most every time we'd come up here, we would come either up through Kūka'iau, or we went home down the Kūka'iau Road, it was shorter and faster.

JG: Yes.

RG: Yes, through the plantation. We entered Kūka'iau Ranch just a little past Hānaipoe, right on this side there's the gulch, across that gulch, you're inside Kūka'iau.

JG: This is not Parker Ranch land now?

RG: No, no. And Dutchy Schumann's place is a little ways back.

JG: Okay.

Group: [begins drive to Keanakolu Cabin]

KM: Oh, looking back at the water shed, you can see the tanks.

PM: Yes.

KM: You know Rally, in between Pu'u 'Ō'ō and Pu'uloa section, do you remember one old stone wall that ran up the slope of the mountain at one point?

RG: Pu'uloa and?

KM: Sort of Pu'u 'Ō'ō section, *mauka* of the road. There's this section of wall that branches, just branches up by itself.

RG: And there was a cattle guard down in the road?

KM: Yes.

RG: What about it?

KM: You remember that wall?

RG: Yes, I remember the wall going up there.

KM: Did you hear anything about it. Was it there before you came?

RG: It was there before I came, yes.

KM: When I took Teddy Bell up, he pointed it out. If you look, I brought something I left with Pat. By and by when you look in the Boundary Commission texts, they named it actually, Kulaka, is the name of this old wall. It was the first cattle pen they built up there, part of a trap or something.

RG: That could have been for Sam Parker.

KM: Before him, this is early 1800s, by 1850s like that.

RG: And what did they call it?

KM: Kulaka.

RG: Kulaka, how do you translate that? *Ku* is to stop, and *laka* is tame, eh?

KM: Yes. So maybe it was by blocking them in there or something, they got them to *laka* over there.

RG: Pu'u Laka, the hill where they were probably fenced in as you say, maybe they put them in there to get them tame.

KM: Yes.

RG: That hill, they had a name, Pu'u something?

KM: You get Pu'u Male or Maile like you said, you have Po'opua'a, Kihe.

RG: What is that one?

KM: Pu'u Kihe?

PM: Kalepa?

RG: Kalepa, yes

KM: Kalepa, thank you.

RG: That's right.

KM: So the tank though, you think that's Kalepa?

PM: I think so. Since we were so far away, I didn't think we were in sight of it. But it must be.

RG: I think that was Pu'u Maile, the one that we were looking at way back.

KM: Yes. 'Cause this is it now with the tank on top.

RG: What did you say it was a little while ago, Pu'u Kalepa?

KM: Kalepa.

RG: Kalepa and Pu'u Maile was the other one.

KM: Yes. I brought that 1930s map that has a lot of good place names on it. We'll look by and by. Peter if you want to look, it's in the back section of my bag, there's one big Humu'ula map, then there's this littler one here...

Group: [Discussing map and locations.]

KM: ...The clouds are moving up.

RG: Yes.

RG: ...They had a terrific fire as I understand it, it was before I came to Parker Ranch. I understand it burned for weeks before they could finally get it out. I think it was further back closer to Hānaipoe.

KM: You came here in '32?

RG: In '34. I don't think it was too much before I came here, because I can remember talking about it, having to come up and camp up here.

KM: Yes... You know at Kahuā, I saw in the *mauka* section of the ranch, a lot of log fencing, *māmane* or *koai'e*, just laid down for making corrals and stuff. Did you folks use, did they do any of that out here at all?

RG: No, not that I know of, no. *Koai'a*, I think was only Kohala mountain, I don't think you'd find *koai'a* any where.

KM: I was wondering about *māmane*, you know the *pā lā'au*, basically, when they laid the logs together for fencing?

RG: Yes. I don't know where you will find *pā lā'au* now... I think they used to cut logs and put them like that, set them like that [gestures interlacing of logs with his fingers]. I think they used to call those *pā lā'au*.

KM: Like your fingers are interlaced.
RG: Yes.
KM: Set it up, that's how they built heights on the fence.
RG: That's right.
KM: Oh, look at the turkeys, they look plump.
RG: Too bad you didn't bring a gun.
KM: Speaking of guns, when you were talking about hunting *kōlea*, did they come out this far or did you stay mostly out back?
RG: You would get them around big ponds of water. You'd wait around those ponds and when they'd come, you'd throw your hat up in the air, why, I don't know. I could never figure that one out, all the old-timers would throw their hat up or find the dry cow *kūkae* and throw that up.
KM: [chuckles]
RG: And then the plover would come at that, and then they'd pop 'em.
KM: They'd come towards it?
RG: Yes.
KM: Just like fish, you *kīpou*...
RG: Yes.
KM: When you throw a little stone inside, drive them away and then they would all come back to check it out. Did you hear about old man Parker hunting plover's and stuff out this side, Humu'ula side at all?
RG: [chuckling] I used to hear that. And the reason I'm smiling is Hartwell Carter used to send men out, send cowboys out by a pond they called Pu'u 'Ōhi'a, down Pā'auhau section. And shoot plover because all the plover would come in there in the afternoon, and the cowboys would go down and shoot them. I couldn't complain and I shouldn't complain, they used to put it in Carter's kitchen and cook them up and boy they were good eating [chuckling].
KM: Was 'ono! [chuckling]
RG: Was 'ono! [chuckling] As I said earlier, "ono ka pu'u!"
KM: A 'oia, yes! Plump yes, they just popped!
RG: Yes.
KM: Sarah, I bet your dad them must have eaten *kōlea* when they were young.
RG: My wife's dad.
KM: Yes...
Group: [Continues drive to Keanakolu.]
KM: ...Does this area have a name that you know?
RG: No, just Keanakolu.
KM: See this kind of 'ōpala, he left this stuff everywhere.
RG: Probably Nobriga.
KM: So sad.

RG: This is where we used to count the cattle. Parker Ranch counted their cattle here as they crossed this area to go into Kūka'iau, to travel down through Kūka'iau. Last count in the morning, just at daylight.

KM: About how many cattle would you be moving at one time, at average?

RG: Five or six hundred.

KM: How many cowboys?

RG: Probably about ten or twelve. They cut the cattle, if they brought them along the road from Laumai'a, they cut the bunches maybe fifteen or twenty and one man would cut them and drive them, and the next bunch would follow. This was to keep them moving along the road, and control them.

PM: With regards to Laumai'a, I'm interested in that camp. Do you know much about when it was built and when it was finally abandoned?

RG: When I came here in '34, Laumai'a was already there. I spent a couple of nights sleeping at Laumai'a when we were moving cattle from Humu'ula, this side to Keanakolu.

KM: Haneberg built the cabins in 1891, '92, at least for the records. There was something there before that, the new cabins went in '91, '92, Pu'u 'O'o Cabins went in also. New cabin and water tank facilities. In fact the phone lines went in, in '92.

PM: Hmm. Now Laumai'a seems to have gone to ruin earlier than the others, did it burn, or something happen to it?

RG: Never any fire there. And I think it was kept right up to Willie Kaniho's time.

KM: So in the '50s?

RG: Yes, I guess so. I can remember Willie and some boys coming up and staying there when they were moving cattle around Hopuwai.

PM: There's still some remains of the old stove pipes there, and a little bit of the foundation that the houses were built on. Everything else is gone, just a few garden flowers planted around.

RG: I guess so, yes. I think you've had an awful lot of poachers on this road for the last ten years. Before, hardly anybody came around now they, I think a lot of people come up here on weekends.

KM: Yes...

PM: Rally, did you hear the name Lahohinu up here?

RG: I never heard of it, no.

PM: It's still on a few maps, and it goes back pretty early, certainly into the 1890s.

KM: Yes, pre-1890s, it's referenced in the 1870s Boundary Commission testimonies.

PM: Yes. It's the place name that every one associates with that early bullock hunter, Ned Gurney. But given the fact that Keanakolu seems to have moved around so much, it's possible that Lahohinu moved around a bit.

KM: Yes.

RG: We used to have rain gauges at all the different stations. You knew exactly how much rain at Ke'amoku. Every 24-hours they would report in. I think that was really a good business. You knew exactly what was going on.

KM: Sure, it gave you the real time information needed to insure that the cattle would be able to handle it as well. That's even around the mountain Keanakolu, Laumai'a, Hopuwai?

RG: Every station. The orders were, you call in to a Japanese guy by the name of Masao, and he was at 5 o'clock and you'd have to get your rain gauge report by 5 o'clock.

KM: Hmm. You know above this Keanakolu section at Kanakaleonui?

RG: Yes.

KM: Did you ever hear any stories about that place?

RG: A lot of people asked me what that meant, and "No I don't know." As I remember, Kanakaleonui was directly above Laumai'a or was it Hopuwai?

KM: We can look at the map by and by [Hopuwai].

PM: There's an orchard that was by the Waipunalei Cabin, did you ever get any fruit off the trees?

RG: Every year we would get apples, and then later they got plums. And somewhere down in there, there were real nice camellias. They did real well up here.

PM: Pua 'Ākala still has some nice plum trees.

Group: [Arrives at gate fronting Keanakolu Cabin.]

RG: [chuckling] Johnny Ah San blamed me for something that happened, and I wasn't too happy about it. One night we were up here at Waipunalei playing cards. Cowboys, all of us. And Johnny came up to play cards with us. We were having a great game, and when he went to go home, he went outside, down the steps, and he couldn't catch his horse [chuckles]. The horse kept running away. And he blamed me for letting his horse loose [smiling]. And I never...wouldn't do such a thing [chuckling]. He never let me forget that [chuckling].

He'd go out and try to catch the horse, the horse would run around the house with the saddle, so he couldn't catch it. And our horses were turned loose out there till the next morning. So the whole group of them would be running around [chuckling], and it would be more difficult for poor Johnny to catch his horse [chuckling].

Group: [chuckling]

PM: I always wondered how much the different groups of people up here stayed together, talked story. You'd have all those CCC boys come up, the Parker Ranch crew, and the Territorial Forestry folks. So I wondered how many nights you all got together and played cards like that. Did that happen a lot?

RG: Yes, it happened. And on the other side, the Humu'ula side, we used to go down to Pōhakuloa, and have dinner with them.

KM: Nice.

Group: [Breaks for lunch, just past Keanakolu Cabin, recorder off . Begin recording again, driving towards area of Lahohinu.]

PM: Okay, there's our turn to go down to Waipunalei.

Group: [Stops at area above Waipunalei Cabins; walks to Historic Sites with Peter, and takes group photos.]

PM: [Talking outside of the truck prior to walk to historic residence feature.] I don't know if you can quite see it. Waipunalei Cabins are...I can just see a little green. Waipunalei Cabins is right down there. This right here is a house site, there's a ten foot deep water cistern here, and that's an old house with a big, big *koa* tree growing right out of the middle of it. This is an old, old house site. [see photo on next page]

RG: [Waits at truck, group walks to house site; recorder off]



***Historic House Site – Lahohinu (Waipunalei Section)
Base of Large Koa Tree Dating from post 1845, Growing on House Site
(Photo No. KPA-N682)***

- Group: [Returns to trucks, and begins drive to the Keanakolu Corral and campsite; recorder on.]
- RG: ...I couldn't have asked for better people to work with.
- KM: Yes. So this residence site here which is *mauka*, basically the Pu'u Lahohinu. You said it's around 12 by 20, the platform?
- PM: Again, the measurements are rough on it because it's not really a perfectly square structure. To say something, it's somewhere about 4x7 meters, but again not perfectly built to any measurements in feet or meters.
- KM: And the cistern?
- PM: The cistern is about ten feet deep, three meters deep, and it's plastered in lime, it has a solid rock wall on the back side of it. It's clearly a great deal of work went on to dig this down to the ground. Also sort of a protective wall that's built up higher than ground level so that these won't just wander into it. That had been completely filled with rock probably from the demolition of the house platform because there's not a lot of other bed rock right there. All of the nails that we found there were square cut nails, there were no wire nails. And the earliest dates for wire nails that you see in Pacific Commercial Advertiser is around 1894, out here. Probably from the bottles as well, that came out of the privy, that is just on the leeward side of the house platform, they all again appear to be 1880s to 1890s medicine bottles.
- KM: Very interesting.
- PM: I can't wait to see the Haneberg Journals, we may be able to piece together some stories on that. It seems from everything that we saw there, it was built, and someone intended to stay a good length of time, and then it was abandoned pretty shortly thereafter.

Something had happened to change the plans of whoever built that place. That was the part that I'd like to be able to fit in the story somewhere. Figure out why that would have happened.

KM: Yes. Now, this Waipunalei Cabin that's below it on the other side of the *pu'u*. That's a CCC?

PM: No, that's Parker Ranch.

KM: That's a Parker Ranch cabin?

PM: Right.

KM: Okay.

PM: And Rally, you stayed there at the Waipunalei Cabins?

RG: Yes.

KM: That's the one that's still standing?

PM: Still standing, where Danny Kaniho...

RG: Sonny Kaniho... Peter L'Orange, do you know him?

PM: No.

RG: He used to stay there.

KM: Pete was here in the '60s right, working in the '60s in the ranch.

RG: Yes...

Group: [continues drive]

KM: ...Did you ever hear any of the old-timers talking about the pit and how David Douglas died?

RG: No, they hardly ever talked about it. In fact, I don't remember them ever talking about it. They would more likely talk about how they caught a wild boar, wild goats or something. No, they hardly ever touched on Douglas.

KM: So in that case then, what everyone refers to as Douglas Pit or Kalua Kauka, did you folks refer to it as that or not at all?

RG: Not at all.

KM: I think it was Bryan, right, who really brought that forward.

RG: I think definitely, yes.

PM: With the monument and the Hilo Burns Club.

RG: That was a great fellow, Bill Bryan, he knew this island better than anybody else. If he couldn't go on his pickup truck, he would go on his horse, if he couldn't go on his horse, he'd walk it. And that's all of Kohala and Kona.

KM: Ah Fat, Dave Woodside and Ah San all talked about him and how he just did just what you said. Since he could do it he expected everyone else to do it.

RG: Yes. He was boss man on the fence around Mauna Kea that the CCC boys put in.

KM: Yes...

PM: ...Keanakolu and that's when this corral complex was built up here. That was called Keanakolu. Then they moved the operations down the road. By the turn of the century the name Keanakolu had gone with the ranch complex.

KM: Okay, that makes sense. That's what I understood from Spencer's time, his complex was here.

Group: [Drives up to old Keanakolu Corral and sites; walks around sites.]

KM: See the *pā* over there, Rally?

RG: Yes. This is the corral that you're talking about?

KM: *Mauka*. There's a little *pā 'eke*, where you can drive them in like that.

RG: I guess it was used for all of these cattle around here. They brought them in here and separated them. If they had to take them to Keanakolu or take them the other way.

KM: Yes, and what's really interesting too though, is when Spencer was operating out here by 1862 or so, they were bullock hunting. They would be driving stuff in and bringing some in. There's some house sites, I think this is part of a wall enclosure here. Just a short distance over there by those *koa* trees, there's another house site and then the caves are down below. The little caves. You never came up here?

RG: No, never did.

PM: [Brings a hinge to show Rally.]

RG: Those are the hinges made by the Parker Ranch Blacksmith.

PM: Parker Ranch Blacksmith, and you said an old Hawaiian blacksmith?

RG: Yes.

PM: He was working still?

RG: Puna, his name was Puna.

LC-S: This is Keanakolu?

RG: Yes.

PG: Rally, you know about this corral?

RG: Yes, this is where they used to drive the cattle and separate them.

PG: You think that was an old house Rally?

RG: I don't know, I've never seen it. I don't remember any house site there...

Group: [Walks around sites of the original Keanakolu Station; recorder off]

KM: [recorder back on, talking to Rally] ...So the *koa* tree over there has another house site underneath it, just like the one that was down where we stopped last above the Waipunalei Cabin. Then if you go just a little further beyond down the slope, are the caves for the naming of Keanakolu, three caves? [see photo on next page]

RG: Yes.

KM: You never came?

RG: No, I never came.

KM: Never had a reason to come up here?

RG: No. And I don't remember any stories. Miranda would know, I'm sure.

Group: [Begins drive from old Keanakolu site to Kalai'eha; Joe Gilman joins us in truck.]

JG: ...So the forest is in reserve above here?

RG: Yes, about a mile above, at Kalepa.



***Historic House Site – Keanakolu (Laupāhoehoe Section)
Koa and ‘Ākala Growth on House Site (Photo No. KPA-N989)***

- KM: Yes, but prior to that they were hunting bullocks all the way up?
- RG: I think so, yes. Maybe that’s when they were using these corrals.
- KM: Yes, like this *pā loa*, this wing fence here?
- RG: Yes.
- JG: And those wild cattle wouldn’t jump this rock wall like a flea?
- PM: Some of those walls are close to five feet high. And I think they were using this area for branding.
- RG: Yes.
- PM: There’s a little platform between two enclosures there, where it looks like they might have been able to set up all their branding tools... Who brought all the railway rails up here?
- RG: Kūka’iau Ranch.
- PM: So that’s another indication that Kūka’iau was up here, like all the railway rails that are set in the ground right there.
- RG: And I’m pretty sure that was Davies...
- PM: How about the wire you used for fences up here. Was it galvanized wire with no barbs on it?
- RG: That’s right.
- PM: All the ranches used that?
- RG: Practically all of them. Because if you use barbed wire, it’s too dangerous for horses. A horse can get tangled in barb wire, that’s probably the end of the horse... But you make a

hog wire fence for cattle it's much better than the plain wire. It's more guaranteed to control your cattle.

JG: This road, Rally, has been here for what?

RG: [chuckling] As long as I've been around. During the CCC, the boys, when they were working on the fence up here they put in a lot of work on the road...

Group: [Passing area designated as Douglas Pit.]

KM: ...He died up here. His death was, by some accounts of curious or suspicious circumstances.

JG: He died down here?

KM: Down there, yes. Gored by a bullock in a pit.

JG: Oh, that's the one Pat was saying they suspected somebody?

RG: Taking the money.

KM: Ned Gurney. He was from Australia?

PM: Ned was from Middlesex, England, and he had been arrested for stealing seven schillings worth, or some very small amount, of lead-sheeting off the roofs of houses. And at that point in the history of England, this is 1817, 1818, you had three different sentences as they were sending you to Botany Bay, Australia. You either got a seven year sentence, a seventeen year sentence, or a life sentence. And he was sentenced to seven years, but he ended up coming over here only a couple of years later, when the British Government had just finished building a ship called the *Prince Regent*, which they wanted to give to Kamehameha I. Kamehameha I had died, and they ended up giving it to Prince Liholiho. Ned Gurney came over with two other convicts as ship hands, and helped deliver this schooner that they had just built. And that was actually the same ship that William Ellis arrived on with two other missionaries, Daniel Tyreman and George Bennet... He apparently jumped ship, and in 1824, he was on Kaua'i, helping Kalanimoku out with the battle over there. And then sometime shortly after that he moved up onto the mountain, here, and began hunting bullocks...

KM: ...So in a day's trip Rally, if you were bringing the *pipi* from...

RG: Makahālau, Hānaipoe.

KM: Yes, coming like that to get over to Kalai'eha, how many days was the trip for your guys?

RG: [thinking] Maybe about five days.

JG: How far is that?

RG: From where we started Humu'ula or Hānaipoe, out to... [thinking] We used to take them from Hānaipoe to...I don't think we took them all the way through, Laumai'a. And it would be about four days, maybe. It all depended on the weather and the cattle. If they were strong cattle they'd go faster, and if it was a cool day they'd go faster. Easier on the animals. I do know that we used to cut them up in bunches. If we had five hundred head, we would start with five hundred, and maybe cut off twenty or twenty-five and one man would take the twenty or twenty-five up the road, and the others would follow. It was easier on the cattle by fewer traveling together. They get over heated if they all pile up.

KM: Hmm.

RG: You know that corral that we looked at, Billy might have the scoop on that. He lived with a lot of the Kūka'iau people.

KM: And I guess with the old man Holi for a while.

RG: Holi, yes...

Group: [passing Hakalau Reserve]

RG: ...We were going to Kalai'eha, and there was a fellow by the name of Walter Stevens, a real good Joe, a good horse man. Best horse man I think I've ever seen. He and I were good friends. I wonder if I ever told you this story.

KM: I don't think so.

RG: We had a old power wagon, and it was loaded with dogs and Filipinos, and it was wet. I was anxious to get out, and so were the men. Walter Stevens, he sat in the very back of the truck. He yelled out, "Rally said more speed!" And the Filipino driver went a little faster. Then Walter said, "Deniscio, Rally says more gas!" [chuckling] He put the gas down [chuckling]. Hey, we were flying along and the dogs were bouncing and bouncing in the truck, and Walter was laughing like hell!

Group: [laughing]

PM: Oh, there's a big gorse, right there.

RG: ...The first time I saw gorse or heard of it was with Buster Brown.

JG: That's a long time ago.

RG: A hell of a long time ago. It was down on the lava flow across from Pu'u Huluhulu. If we had only gotten after it at that time, or they had gotten after it, it would be okay.

KM: You know what's really interesting about that, just like you said, if you folks had gotten after it. But you folks, the ranch actually had a program. You folks were managing and pulling gorse pretty consistently until what around '80 or something right?

RG: Yes.

KM: It was after Richard came in and all that stuff changed. It never exploded before. Remember, Haneberg them reported in by June of 1892 as a problem. Not as a problem but being present on the land in 1892, it's in his journal. They were pulling it, they had gangs out pulling it, just like you folks for the ranch. Even when we were talking with Hisa. Part of his job at one point, they were using some horrible poison, but it kept it down.

RG: I know at my father's place, when we're not going to school, we'd have to go and pull lantana and guava.

KM: Sure.

RG: This gorse is real healthy.

JG: It's just green thorns.

RG: And you cannot put a horse in there. A horse won't go.

PM: It gets a lot worse than this, the whole road is going to look like this in another ten miles. And it's not just going to be little patches, it's going to be the whole road...

KM: ...You haven't seen the worse yet, it's so thick further over.

RG: Did I understand you to say that sheep eat gorse?

KM: No, that's what I was asking you. The young gorse?

RG: I have never known of sheep eating gorse. I've heard other people say the sheep would eat gorse, but I have not seen them.

KM: That's why I was asking, if after the sheep were taken out, if it seemed to get out of control or something?

RG: No, I don't think so. I think you'll find people that will agree with that, that after the sheep went out the gorse came back stronger but I don't think so. I'm probably wrong. We haven't seen any cattle here, that's all I'm interested in practically [chuckles].

KM: They've been working on getting them all out.

RG: I heard that now, they got a trucking outfit by the name of [thinking] Hawaiian outfit in Waimea, they are tied up with Sonny Keākealani and they are in the trucking business. They are helping Sonny truck the cattle out to market. And the price of beef has been pretty high lately...

Group: [Comments about the gorse infestation.]

KM: ...That's the hard thing, Parker had the lease in a section of here, for most of it. And the requirement was that, "it be returned in as good or better condition" and it's supposed to be a Hawaiian Homes Beneficiaries use, it will never happen.

RG: I can remember very clearly when this lease was picked up by Parker and when it was taken, it would have to be returned in as good a shape as it was let out.

KM: Yes. The State has a dismal record of enforcing any of that.

RG: Yes.

KM: Upon any of it's leases throughout the islands... We haven't come to Wailuku yet, either. We're still a ways away from Pu'u 'Ō'ō at least, we didn't cross the river yet right?

RG: No. I think we have quite a ways to go. With all this gorse the place looks different.

KM: Did you ever see the silverswords that were up above Pu'u Kahinahina?

RG: No, I never did. I heard people talking about them.

KM: Yes.

Group: [Stops at the Wailuku Gulch crossing; recorder off. Pat joins us in truck, Joe rides in another truck; recorder back on. Driving from Wailuku Gulch towards Kalai'eha.]

PG: You can't see the pigs any more. You can't see the sheep any more. I think it's a sad case, that they let it go this far.

PM: So many things would be dealt with more easily if people would stay on top of them.

KM: Yes.

PG: Ricky says this herbicide doesn't do any good because the green stuff is coming up underneath, it doesn't get it's roots. It's not systemic, and it's very expensive. Then they burnt it, but it's still not getting the roots, and it's coming up back there. But Laura says where Ricky cleaned at the Hakalau Forestry place, you don't see any gorse. I said, "What did you do?" Ricky bulldozed and pulled them up by the roots, got rid of that, then when the new seedlings come up, they go in and they spray them and when they're young, it kills it. This way doing it, it just keeps coming back...
There's that cobblestone road again, it's so beautifully exposed, I've never seen it like this in all the years. Rally, this is the old cobblestone road put in 1850s?

KM: Some of it is the old road and then the CCC did their tasks with it also. It's amazing!

PG: This was to get the wool down to Waimea. Why didn't they go down to Hilo. Because they couldn't go through the forest?

KM: Yes. From Spencer's Operation he was based out of Waimea too. Everyone just sort of followed suit, as the leases transferred.

PG: So the road, you were talking about the wool going down to Hilo, no. So it was better to take them to Waimea, because of Spencer...

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Scenic Analysis - Laupahoehoe research and Education Center
Attachment A

Proposed building site images



The top photo above is from the proposed building site showing the natural, open forested scene. The lower photo is a photo simulation showing the scenery with a building and parking as proposed for the Research and Education Center. This is only part of what would be constructed on the site.



This photo is of a residence in Laupahoehoe on the road to the proposed Center site showing how the buildings could be similar to local rural style.

Road and electric line images



Above are typical views of the highly scenic earth, ocean, sky; these views are found along the road look north and northwest from the power line connection point to the place where the road enters the eucalyptus plantation.



Above are views from the vicinity of the project of the same scenery showing the view with electric lines installed. These linear elements, while commonly found in the rural locale of the project, are an unnatural intrusion into the scenic view plane.



Above on the left is a scene from the road at the top of the slope just before the road turns up hill as it exists, on the right is a photo simulation showing how it would look with poles and lines in the view.

Pond with wind generator turbine and tower image



This photo simulation illustrates how a wind turbine tower would appear in the pond site.