

5/22/11

DRAFT ENVIRONMENTAL ASSESSMENT

KAINALU MESIC FOREST RESTORATION PROJECT

LANDOWNER INCENTIVE PROGRAM

Molokai District
Maui County

In accordance with
Chapter 343, Hawai'i Revised Statutes

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I. SUMMARY

Project Name Kainalu Mesic Forest Restoration Project
Landowner Incentive Program (LIP)

Project Location Kainalu Ranch
Maui County, Island of Molokai,
Kainalu Ahupuaa: TMK (2)5-7-005:022 portion and
5-7-003:053

Land Use Conservation District, Resource Subzone
Agricultural District, A-1a zoning

Applicant Dunbar Ranch Partners

Landowner Dunbar Ranch Partners

Approving Agency State of Hawaii Department of Land and Natural
Resources

Anticipated Determination Finding of No Significant Impact

Agencies & Organizations Consulted

U.S. National Park Service - Kalaupapa National Park
Department of Land and Natural Resources
Department of Health
Office of Conservation and Coastal Lands
Office of Environmental Quality Control
Office of Hawaiian Affairs
County of Maui Planning Department
County of Maui Department of Water Supply
U.S. Fish & Wildlife Service
Molokai Soil and Water Conservation District
University of Hawaii, College of Tropical Agriculture and
Human Resources
Molokai Land Trust
State Historic Preservation Office
Office of Environmental Quality Control
USDA Natural Resource Conservation Service

Summary of Proposed Action

The proposed Kainalu Mesic Forest Restoration project will protect sensitive riparian areas and native species habitat that include several federally listed at risk species. The proposed project area is located on the eastern end of Molokai, upland from Kamehameha V Highway at approximately 1,300-1,800 feet elevation. Historically, this land was used for agriculture, cattle, and forest conservation. Although the property has generally been preserved for its watershed values, the presence of nonnative ungulate, such as pigs, deer and goats, have altered native forest compositions and structure as well as increased soil erosion rates.

This project will seek to protect two upland streams, Welo and Kahawaiiki, from browsing nonnative animals through strategic fencing. The fencing will border the upper reaches of both stream gulches to stop animal traffic into the streambeds and will be utilized to control feral and domesticated animal movement in the adjacent pasture areas. The immediate scope of the fence line is approximately 1.5 miles; however a much larger area will be protected from animal trampling and soil erosion. The project will also enhance the existing unique habitat by planting native species to support greater canopy development and expand the native plant buffer around them.

The proposed project is not anticipated to have significant negative impacts, but is anticipated to improve environmental benefits associated with watershed protection and restoration of native species habitat. The proposed project will improve water quality and quantity in the region by enhancing the capacity of the existing forest cover. Over the long term, this project expects to have a net positive benefit to the environment and overall watershed function in East Molokai.

The project area is private land in the Conservation and Agricultural District and will utilize the Federal Landowner Incentive Program (LIP) and private funds to accomplish all project goals. As such, the project requires an environmental assessment to be prepared in accordance with Chapter 343 of the Hawai'i Revised Statutes.

II. PURPOSE AND NEED

The Hawaiian Islands provide excellent examples of unique ecological and evolutionary adaptations largely due to the isolation of the islands from continental landmasses. Native Hawaiian species have evolved into an array of native forest birds, plants, and insects; many of these species adapted to life without significant competition for resources. Many native plants, for example, no longer needed defensive strategies to protect themselves from the threat of browsing animals as none were present in early Hawai'i. As browsing and

other more competitive species were introduced to Hawai'i by human inhabitants, native species were not as capable of protecting themselves or competing for resources. As such, many native plants and animals in Hawai'i are recognized as "at-risk" species - including many that are classified as "threatened or endangered" species by the U.S. Fish and Wildlife Service. In order to preserve these species, native habitats need to be protected from threats, and degraded areas need to be restored to a native-dominated community.

Upper elevation forested watersheds in the Hawaiian Islands are important recharge areas for aquifers that supply essential water for agriculture and household uses. Unfortunately, many of the native forested watersheds have been degraded or replaced by the spread of nonnative invasive plants, feral animals, or by human conversion of land to non-forest uses. The demand for water on the island of Molokai is high, with only four potable water wells to provide the majority of water for residents. The east end well is currently the only well in stable pumping conditions, which can largely be attributed to frequent rainfall and the relatively healthy forested watersheds that transfer collected water into the aquifer. Although the east end of the island has a stable water source, management of the watershed is needed to stop ongoing degradation by nonnative animals.

The south shore of Molokai comprises some 11,000 square miles of reef area and stretches from La'au Point on the west to Cape Halawa on the east, a distance of over 32 miles. This area is known to have some of the most pristine reefs in the United States. In some near shore areas, however, the reef is impacted by silt and sediments eroded from the island. This sediment smothers coral reefs and reduces health and productivity. Nonnative animals, droughts, loss of watershed canopy, and lack of good pasture rotation programs are all recognized threats or impacts that have lead to increase erosion rates. Restoration of native habitat along riparian areas and protection of upper watersheds is essential to reducing sedimentation on Molokai's coral reef.

The proposed project seeks to restore native species habitat to perpetuate Hawaii's unique species, protect the forested watershed from further degradation, and improve the forest condition to decrease soil erosion and sedimentation in streams. The project will restore and protect a portion of the Kainalu Ranch, which is suitable habitat for rare native species and important for water resources. Fencing will be placed strategically to keep nonnative browsing animals away from sensitive areas, including riparian areas that transport sediments to Molokai's lowlands and reefs. Additionally, planting will be used to create greater tree canopy, native ground covers, and buffer sensitive areas, which will reduce erosion and create a suitable environment for the reestablishment of rare native species.

III. PROJECT DESCRIPTION

The objective of the proposed project would be to 1) install a strategic fence line located along the upper reaches of two riparian gulch areas to stop nonnative animal intrusions, 2) remove a variety of invasive plants and animals, and (3) plant and manage native species to increase canopy and buffer sensitive areas. Fencing will curtail nonnative animal intrusion, which will afford greater protection to existing native species and newly planted areas. The strategically placed fence line will also decrease soil erosion and sedimentation in the stream-riparian areas. The immediate scope of the proposed project is approximately 1.5 miles of fence line and 15 acre restoration area; however a much larger area will be protected from animal trampling and soil erosion.

Fence line

Fencing is the most effective method for protecting sensitive areas and riparian streams from feral and domesticated ungulate browsing. The design for the proposed project's fence line will include the immediate target areas, as well as buffer areas of good quality habitat for future replanting efforts. The proposed fence line will incorporate natural barriers, such as ridgelines and cliffs along the stream courses to protect a larger area without the need to fully enclose the entire area. The fence line is designed to direct animal movement and behavior away from sensitive areas by tying the fence into abutments. The fencing will stop animal traffic into the stream areas and will be utilized to control feral and domesticated animal movement in the adjacent pasture areas.

The proposed project will install approximately 1.5 miles of fence that will parallel the upper reaches of the Welo and Kahawaiiki stream areas. An approximate ten foot wide area will be cleared to ground level of vegetation for the fence line using hand tools. Due to the hilly terrain, steep slopes and proximity to deep gulches hand tools and manual labor will be the primary method used for this fence construction. The fence will be woven-wire hog-proof fence. No barbed wire will be used in the fence to prevent potential negative impacts of bird or bat entanglement, except for a single strand of barbwire will be used along the very bottom of the fence to prevent pig burrowing. The fence will be seven feet in height, with the upper three feet necessary for deer-proofing the fence line. This specific fence design has had great success when used in projects of similar nature, both in upland and lowland areas on Molokai. All rare native plants and trees over 15 feet in height that may be used for Hoary bat roosting will be avoid during fence construction. Additionally, the fence line will not be constructed from May to August to minimize potential impacts to Hoary bat during breeding and pup rearing season. To increase the visibility of the fencing, marking tape will attached to the top of the fence.

A backhoe will be required to tighten the fencing, in accordance to federal specifications, in some areas, but will be avoided if possible. Machinery will

only be used weather permitting and on level and in open pasture areas. Four-wheel drive vehicles will be the primary mode of delivering all fencing materials to the project areas. Any machinery use will be kept to a minimum and remain on established roadways to reduce potential soil erosion. Directly after the fence line is installed, ongoing monitoring will take place looking for any faulty/weak areas in the fencing, which if found will be repaired immediately. Kainalu Ranch staff and local contractors will install all fencing and conduct all future monitoring of the fence for potential breaches.

Invasive Species Control

All nonnative, invasive plants will be removed from the fence line and adjacent protected areas. In heavily infested areas small hand held equipment or tools, such as chainsaws and machetes, will be used to clear invasive plants. Where applicable, government approved basal and foliar plant herbicides will be used, only by certified personnel, to reduce new growth of extremely weedy invasive plants. Target species for removal include Koster's curse (*Clidemia hirta*) and Strawberry guava (*Psidium cattleianum*). All chemical applications will be kept to a minimum and will only be prescribed in the most heavily invasive monocrop areas. All precautions will be taken to prohibit any impact on native plants and sensitive avian habitats.

Native Species Restoration

A total of eleven federally listed endangered (E), species of concern (SOC), and/or candidate (C) species will directly benefit from this project (Appendix C). The plant and animal species expected to be protected and/or planted are: *Kokia cookei* (E), *Clermontia kakeana* (SOC), *Diospyros sandwicensis* (SOC), *Santalum ellipticum* (SOC), *Melicope reflexa* (E), *Cyanea dunbarii* (E), *Pisonia* sp. (SOC), *Gardenia remyi* (C), *Prichardia munroi* (E), *Brighami rockii* (E) and the Hawaiian native goose (Nene) *Branta sandwicensis* (E). As part of the proposed project's restoration more common native plants will be planted within the protected area to begin restoration of suitable native habitat for more rare native species. As the site becomes more suitable, rare native species will be planted in the protected areas.

All precautions will be taken to ensure that no native plants or animals will be harmed during the proposed project. Each of the project's at-risk species is expected to benefit from this project by eliminating trampling, browsing and rooting from feral animals; and by creating a noncompetitive environment for the native species to survive and flourish. The ultimate goal of the project is to protect sensitive areas, promote native species regeneration and create a larger, more diverse gene pool for rare species. The primary success of the proposed project will be measured by the completion of fences, by the number of native plants installed, the number of invasive species removed and controlled, and by overall planting survivorship. Further success will be noticeable evidence in the expansion of emergent native plant natural regeneration in the understory.

Table 1: Proposed Project Timeline

Project	Approx. Start	Approx. Completion	Restrictions
Fence line Installation	November 2011	January 2012	No building from May-August
Invasive Species Removal, Control & Monitoring	November 2011	Continuous	No building from May-August
Native Species Planting	December 2011	February 2011	Availability of species

Table 2: Estimated Project Budget

CATEGORY	APPROXIMATE COST
Fence line	\$80,000
Invasive Species Control	\$45,000
Native Restoration	\$25,000
Totals	\$150,000

The landowner's contribution to the project is approximately 41% of the total project cost. Funding for this project includes input from federal and landowner funds. The Landowner Incentive Program grant will fund staff time to prepare the planting sites and construct the fence line, develop permits and planning, collecting seed for planting, equipment rental, and purchase other necessary materials. The landowner will provide all long term maintenance and monitoring, incipient invasive plant removal, and future restoration efforts.

IV. SUMMARY DESCRIPTION OF AFFECTED ENVIRONMENT

Location and Physical Characteristics of the General Area

The proposed Kainalu mesic forest restoration project will encompass approximately two miles of fence line and fifteen acres of native restoration located in East Molokai. The proposed project is located on a portion of the Kainalu Ranch, which represents an entire watershed of approximately 1,200 acres. The Kainalu Ranch extends from sea level to the Wailau Valley Rim at 3,400 feet elevation, and covers a distance of nearly three miles. The proposed project is located at approximately 1,300-1,800 feet elevation.

Lands surrounding the project area are additional Kainalu Ranch lands, Molokai Land Trust and various neighboring landowners. The surrounding lands are mixed use including lands managed for conservation, grazing, small scale agriculture, and low-density housing lots.

The proposed project can be accessed from Kamehameha V Highway via a private four-wheel drive access road near the 18-mile marker. A series of locked gates prevent unauthorized users from entering the project area. Rainfall

in the project area averages from 75 to 120 inches annually with the largest rainfall at the upper elevations. The upper portions of the property are supplied precipitation via the northeast trade winds.

Soils

The project areas include soils primarily of Niulii silty clay loam, 7 to 30 percent (NLE), but also includes Tropaquods (rTO) and Rough mountainous land (rRT) in the riparian drainage areas.

Water Resources

There are two perennial streams, Kahawaiiki and Kainalu, and a number of tributaries on the property. The proposed project will protect Kahawaiiki stream and Welo tributary of Kainalu stream. The streams and their associated tributary headwaters are located on the upper reaches of the Kainalu Ranch. The streams are also potentially susceptible to limited flooding during storms that generate high rainfall events.

Current Land Use and Zoning

The proposed project is located within the Resource subzone of the Conservation District as well as Agricultural District. The project area is not located in the Maui County's Special Management Area, nor the State of Hawai'i Restricted Watersheds, Hawaii Administrative Rules (HAR) §13-105-3.

Flora

The entire Kainalu Ranch represents a range of ecosystems that each are dependent on unique topography and microclimates. The available water features and systems on the ranch also contribute to the general richness, diversity and extent of the flora and fauna in the upland and lowland areas of East Molokai.

The proposed project area is primarily characterized as mesic forest type with variations due to topography; there are small areas of dryland forests found through the ranch. Both Kahawaiiki stream and Welo tributary have significant numbers of native plant species in the valley floor and on the side of the gulches. *Diospyros sandwicensis* (lama), *Pisonia* (papala kepau), *Santalum ellipticum* (iliahialoe), *Bodea elatior* (ahakea lau nui), and *Cyanea* together with several *Clermonita* spp., can be found within gulch areas. Additionally, recently identified native hibiscus can be found within the confines of these two riparian systems.

Nonnative species found within the proposed project area include monotypic-stands of Koster's curse (*Clidemia hirta*) and Strawberry guava (*Psidium cattleianum*). Additionally, present in the general area are Formosa koa (*Acacia confusa*), Ironwood (*Causarina* sp.), and Christmas berry (*Lycium carolinanum*). A full list of the all flora found within the area can be found in Appendix C.

Fauna

The Hawaiian Hoary bat (*Lasiurus cinereus semotus*) and the Nene (*Branta sandvicensis*) have been sighted in the general area of this project. Nene are generally found in the flat open grassy areas with plenty of available water. Other native wildlife known to the ranch include seabirds, Newell's shearwater (*Puffinus auricularis newelli*) and the Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*).

Non-native mammals found on the ranch: pig (*Sus scrofa*), Axis or Chital deer (*Axis axis*), cow (*Bos Taurus*), rat (*Rattus* sp.) and small Indian mongoose (*Herpestes auro punctatus*). A full list of fauna on or near the project area see Appendix B.

Significant and Sensitive Habitats

While this project area is not within federally listed critical habitat, there are sensitive areas and species, primarily associated with riparian areas.

Archaeological Sites and Cultural Practices

The following steps were taken to determine the current and historic cultural significance of the project area:

- (1) A general literature review was conducted to amass reports or studies with relevant information;
- (2) Pre-consultation letters were sent to a variety of agencies and organizations that might be interested in the project or have relevant information, including: the State Department of Hawaiian Home Lands, the Office of Hawaiian Affairs, and adjacent landowners;
- (3) An archaeological search was completed to determine the presence of any visible archaeological features, such as rock walls, or any features potentially used for cultural reasons, such as lava tubes or caves;
- (4) Historical records review of the general area surrounding the project area was conducted.

History

There is a rich history associated with Kainalu lands; however most of the significant land altering activities took place in the lower elevations. During pre-contact period on Molokai, most habitation focused along coastal habitats. Early inhabitants utilized the ocean and inland resources primarily for their livelihood. Settlements built fishponds along the coast and numerous cultural sites through Molokai. The most significant land altering activities took place in the lower elevations, likely for housing and canoe materials. The gently sloping regions that received steady rainfall in the mid-elevations were likely used for agricultural production. Upper elevations were likely only utilized for their bird resources, primarily for feathers, and other cultural resources including wood and cordage. As the lands of Kainalu Ranch represent an entire watershed, they were likely utilized for numerous of resources.

In the mid 1800's J.H. Kanepuu described the land of Kainalu as "Kainalu was well known and it is said that the Chief Abner Paki (father of Bernice P. Bishop and grandson of Kamehameha-nui) was born there. Kainalu was a goodly land to settle upon...the plains of this place are good and life there is pleasant" (Kanepuu, 1868, Summers 1971). During the mid 1800's many native peoples were relocated to Kainalu from other areas on Molokai such as Waikolu, Kalawao, Polapola, and Mahulili, to make room for leprosy patients that were relocated to Kalaupapa

The Great Mahele of 1848 awarded lands to individuals, the government, and the crown. The lands of Kainalu were designated as crown lands, to the Kingdom of Hawaii. In 1894, the ahupua'a of Kainalu was sold by the Hawaiian Kingdom to Mrs. Emma Nakuina, a prominent Hawaiian woman, who later sold these lands to Mr. Bowen and Cassidy, who then retained these lands until 1915. James and Isabella Monroe bought the land in 1915 and established the Kainalu Ranch. James Munro was originally from New Zealand, but moved to Hawaii in the 1890's and managed Molokai Ranch. He married Isabella Maau Mutch a teacher and woman of Hawaiian ancestry. Both brothers, James and George Munro, had significant influence on both Molokai and Lanai through their management of Molokai Ranch, creation of Lana'i Cattle Company and the Munro trail, discovery of unique flora, and planting of thousands of Norfolk and Cook pines on both islands.

The Monroe's grew pineapple and raised Peking ducks, pigs, and eventually cattle on Kainalu Ranch. In 1948, the land was transferred to the Dunbar family line. In 1978, all of the cattle on this ranch were sold and the ranch eventually fell into disrepair. In the late 1980's, the current owner began improving fences and restoring the ranch for conservation purposes. Since then the primary focus on the ranch has been small agriculture operations including flowers, avocado, citrus, cattle, kou trees (*Cordia subcordata*) and restoration projects such as Ipukaiole fishpond restoration, upland forest stewardship, rare species establishment and wetland restoration.

Archaeological features

There are no known or documented archeological features on the proposed project area. The Kainalu Ranch and eastern Molokai are rich in cultural sites and history; however, there are no documented archaeological sites in the proposed project areas. Some of the notable archeological sites found on Kainalu Ranch include Kainalu heiau (rain temple), Pu'uaniani heiau (agriculture temple), Ipuka'iole fishpond and Kainalu fishpond. There are other notable archeological features found through eastern Molokai, but there are no known archeological sites that will be impacted by the proposed project.

Contemporary cultural practices

There is currently limited access to the area and cultural use is not anticipated to be impacted by the proposed project. Subsistence or gathering for cultural purposes may be permitted provided the ranch has adequate notification prior to such activities. The gathering of plant material for lei making, medicinal use, or other native Hawaiian traditional uses is allowed on Kainalu Ranch with proper notification and scheduling with the landowner. Traditional subsistence hunting and hunting for management purposes will be allowed with proper notice and scheduling with the landowner. There were no cultural practices identified by consulted parties during pre-consultation that may be impacted by the proposed project.

V. ALTERNATIVES CONSIDERED

Three project alternatives were considered:

- (1) The proposed action consisting of fence construction, invasive species control, and native species planting (preferred alternative);
- (2) An alternative involving only invasive species management and native planting; and
- (3) A no action alternative.

Alternative #1: Encourage restoration through fence construction, invasive species control, and native species planting (preferred alternative).

The preferred alternative is to protect and restore the project area as outlined above. This preferred alternative will enhance watershed capacity, decrease soil erosion and sedimentation in near shore systems, restore native forest, increase wildlife habitat, and contribute to the recovery of several rare and endangered native. Furthermore, Alternative #1 is anticipated to increase aquifer recharge rates as sensitive riparian areas are protected and restored with native vegetation.

Alternative #2: Encourage restoration through invasive species control and native species planting.

Alternative #2 proposes to restore and manage the project area without the fence construction. While this alternative would allow for restoration activities to be implemented, project success would be limited. Without the proposed fence line, the project area would be continued to be negatively impacted by feral and managed ungulates. Restoration with rare native species would not be advisable because their survivorship would be decreased due to the access of the area by browsing animals. Additionally, the riparian areas would not be protected from the presence of ungulates which can lead to increased soil erosion and reef sedimentation especially in sensitive areas. This alternative does not meet the purpose and need of the Landowner Incentive Program and is thus eliminated from further analysis in this environmental assessment.

Alternative #3: No action.

The no action alternative continues the current state of the forest watershed and the valuable benefits provided by a restored native species and habitat would not be realized. The project area would continue to be degraded as browsing animals would continue to alter native habitat and structure. The no action alternative reduces the potential for success of positive conservation measures, such as native species planting that are necessary for the long-term recovery of many native ecosystems.

VI. GENERAL DESCRIPTION OF THE PROPOSED ACTION INCLUDING ENVIRONMENTAL AND SOCIOECONOMIC CHARACTERISTICS

Environmental Impacts and Mitigation Measures

While this project is not expected to have any significant negative impacts on the environment, the following items were evaluated as possible resources that may be affected. Planned actions to mitigate possible negative effects are also described below.

Native vegetation

The fence line clearing activities are anticipated to disturb mostly nonnative vegetation. Any young, healthy native vegetation in the project area will be avoided and if rare native species are encountered very effort to include the species within the proposed protected area will be made. There will be no significant negative impacts to native plants.

Native Vegetation Mitigation Measures

In order to minimize overall damage to the remnant native vegetation in the project area: 1) areas with sensitive biological resources or with standing healthy live trees will be avoided during bulldozer operations and 2) if rare, threatened or endangered species are located during project activity, work will be halted to assess the impacts and mitigation measures for such individuals.

Native fauna

The limited nature of the proposed action is anticipated to have a negligible impact on native animals. Over the long-term, the impact on native animals is expected to be positive as native forest restoration will provide additional habitat for native species. The construction of the fence will also have a minimal impact on native animals due to the limited nature of the activities as well as the fence is designed to prevent bird or bat entanglement in barbwire. There are no significant negative impacts to native fauna anticipated.

Native Fauna Mitigation Measures

If rare, threatened, or endangered species are present during project activities, all work will be halted to assess the impacts and mitigation measures appropriate for such individuals. No barbed wiring will be used on fences to avoid bird or bat entanglement.

Alien species

Fence construction could increase the risk of accidental introduction or spread of nonnative plants and animals within the project site. The transport of equipment as well as disturbance of ground surface and vegetation involved with clearing the fence line can create conditions suitable for the establishment of invasive plant species.

Alien Species Mitigation Measures

The following practices will be implemented to minimize the introduction and establishment of nonnative plants and insects: 1) boots, equipment, and materials will be inspected and cleaned of any mud, seeds, eggs, larvae, etcetera, prior to delivery and/or entry into the project area; 2) equipment used during fence construction operations will be inspected and cleaned, following appropriate invasive species prevention protocol; 3) all workers involved will be instructed on specific procedures to prevent the spread or introduction of invasive nonnative plants in the project area; 4) precautions (herbicide control, inspections of field equipment, and periodic monitoring) will be taken to prevent the spread of invasive plants already found in the project area; and 5) all food, refuse, tools, and gear will be removed upon project completion. The project area will be monitored for new introductions during and after project completion.

Archaeological or Culturally Significant Sites

There are no known archeological or culturally important sites within the proposed project area and thus no significant impacts are anticipated. No archaeological sites were discovered during an initial survey of the proposed project fence line. Additionally as the vegetation will only be cleared to ground level, it is unlikely that any buried cultural sites will be disturbed.

Archaeological or Cultural Mitigation Measures

While there are no archaeological or culturally important sites anticipated to be adversely affected by the proposed actions, should any such sites be encountered during construction or operations, all activities would immediately cease and the appropriate agencies will be consulted to ameliorate any negative impact. During the pre-consultation process, the agencies and individuals with interest were consulted prior to the preparation of this document. All appropriate measures will be taken to avoid any potential harm to sensitive sites, including all areas before any work is performed.

Water Impacts

Based on the nature of the terrain, no adverse changes in the normal runoff or percolation patterns are anticipated as a result of this project. The overall restoration and riparian protection is anticipated to improve percolation and watershed function. The limited nature of the fence line construction activities and no ground disturbance will allow for a minimal impact on soil erosion and all grading work shall conform to the County's best management practices. There is no anticipated water discharge need from the project areas activities.

Water Pollution Mitigation Measures

To minimize potential impacts to water resources in the region (i.e. soil erosion, water runoff, or rainfall washout), project activities will be conducted during dry weather conditions and will not require any major ground disturbance. Additionally, all operations will cease when ground conditions are such that excessive damage to soil condition will result.

Air pollution

Limited air pollution from the use of small power tools will be unavoidable. Use of this equipment is temporary and is not anticipated to significantly alter the overall air quality in the region. Additionally, discharge of visible fugitive dust, if any, is not anticipated to travel beyond the property line. There are no anticipated significant negative impacts to air pollution.

Air Pollution Mitigation Measures

Although there is no significant anticipated effect on the air quality of the proposed project area during reforestation activities, proper mitigation measures will be used during construction. Any debris hauled out from the project areas will be covered and roadways will be maintained in a clean manner during project implementation.

Fire Impacts

The rainfall on Kainalu Ranch can be variable ranging from 40 to 150 inches annually. During times of extreme drought the land area may be subject to wildfires.

Fire Mitigation Measures

There is no anticipated significant increase to wildfire threat; however, normal fire prevention will involve the maintenance of access roads to serve as fire response road and firebreaks.

Environmental benefits

Environmental benefits associated with the project include restoration of an important native ecosystem, creation and improvement of habitat for both common and rare native plants and animals, and improvement of watershed function.

Socioeconomic Impacts

Overall, socioeconomic impacts of this project are expected to be positive. The restoration of Hawaii's native forest will enhance opportunities for stewardship, education, cultural enrichment, and research.

Economic Impacts

The proposed action involves the expenditures of funds necessary to complete the project. The estimated cost of the proposed action is approximately \$150,000 (Table 2). Current support for the project includes approximately \$87,000 provided by the Landowner Incentive Program. The project is not expected to have a significant negative economic impact to public resources. Small positive economic impacts will result from the release of project funds into the economy through the purchase of goods and services from local vendors.

Noise Impacts

Periodic noise from power tools and other activities associated with the project will be unavoidable during fence construction operations, but is anticipated to be minimal due to the short project time-duration and remote location of the project area. There are no permanent residences located near the project area, and work associated with the project will occur only during daylight hours.

Noise Pollution Mitigation Measures

All construction related activities will be conducted during normal business hours.

Visual Impacts

Negative visual impacts to adjacent communities and the larger public are expected to be minimal and in most cases considered beneficial. Visual impacts are expected to be negligible and not visible to the public from any major roadway due to the current existing vegetation cover, and thus no mitigation measures are required.

Traffic & Infrastructure Impacts

Construction activities are of a temporary nature and are not anticipated to impact major roadways, and thus no mitigation measures are required.

Cultural Impacts

The proposed action is not expected to affect any archaeological sites or historical features within or nearby the project area. The proposed actions are also not expected to negatively impact Native Hawaiian traditional and cultural practices due to 1) the remoteness of the project area, 2) the current limited access to the area, and 3) the restoration purpose of the proposed action. Therefore, this project is not anticipated to negatively impact any contemporary cultural practices.

VII. ANTICIPATED DETERMINATION

The project is anticipated to not have a significant negative impact on the environment, and thus a Finding of No Significant Impact (FONSI) is anticipated.

VIII. FINDINGS AND REASONS SUPPORTING EXPECTED DETERMINATION

This proposed project is expected to preserve, improve, and create native habitat for Hawaii's rapidly diminishing native species via strategic fencing, invasive species control, and native species planting that will provide for riparian enhancement and mitigate Molokai's elevated erosion rates. Additionally, successful planting of proposed and candidate species would contribute to reducing the need to list those species in the future.

The anticipated Finding of No Significant Impact is based on the evaluation of the project in relation to the following criteria identified in the Hawai'i Administrative Rules § 11-200-12:

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

The proposed action does not involve an irrevocable commitment to loss or destruction of any natural or cultural resource. Instead, the goal of the proposed action is to improve native species habitat through watershed protection.

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

The proposed action will not curtail beneficial uses of the environment. Instead, the project will increase beneficial uses by restoring native species, which will increase the capacity of the watershed, an important habitat for many native plants, animals, and invertebrates.

- 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.*

Restoration of the project area will aid in the watershed protection. The proposed action is consistent with the environmental policies established in Chapter 344, Hawai'i Revised Statutes (HRS) and contributes to the conservation of threatened and endangered species by increasing the acreage of native forest available as habitat for rare species.

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

The proposed action will not adversely affect the economic or social welfare of the community or state. The ecosystem-related goals of the project will directly benefit the economic, cultural, educational, scientific, and recreational interests of the community and the state.

5) *Substantially affects public health.*

The proposed action is not anticipated to substantially affect public health.

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

The proposed action is not anticipated to result in any substantial secondary impacts, such as population changes or negative effects on public facilities.

7) *Involves a substantial degradation of environmental quality.*

The proposed action does not involve a substantial degradation of environmental quality. Instead, environmental quality is anticipated to improve with the implementation of the proposed action.

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

The proposed action does not have a negative cumulative considerable effect on the environment nor does it involve a commitment for larger actions. Though it is anticipated that the results of this project will be positive, restoration of this area alone is not sufficient to provide for all watershed and habitat needs. Any cumulatively effects that may result from the project are expected to be beneficial to the community and state.

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

There are no known rare, threatened or endangered plants within the proposed project area. However, rare native plants and animals have been documented in along the riparian area. Rare native species are anticipated to benefit from native forest restoration and the additional benefits associated with protection from the fence line.

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

The proposed 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 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.*

The planned action is not located in the flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal water and so will not affect such environmentally sensitive areas and is not likely to suffer damage from these events.

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

The proposed action is not anticipated to affect any vistas or view. Given the surrounding terrain and proximity to existing forest, the fence line and restoration of the native forest in the project area is unlikely to substantially affect any scenic vistas or view planes.

13) *Requires substantial energy consumption.*

The proposed action does not require substantial energy consumption, but instead will consume small amounts of energy during fence construction activities.

IX. LIST OF PERMITS REQUIRED FOR PROJECT

Construction of the project is anticipated to require the following permits: State of Hawaii Conservation District Use Permit.

X. ENVIRONMENTAL ASSESSMENT PREPARATION INFORMATION

This Environmental Assessment was prepared by Lance Dunbar of Kainalu Ranch and Dunbar Ranch Partners with consultation from experts.

XI. REFERENCES

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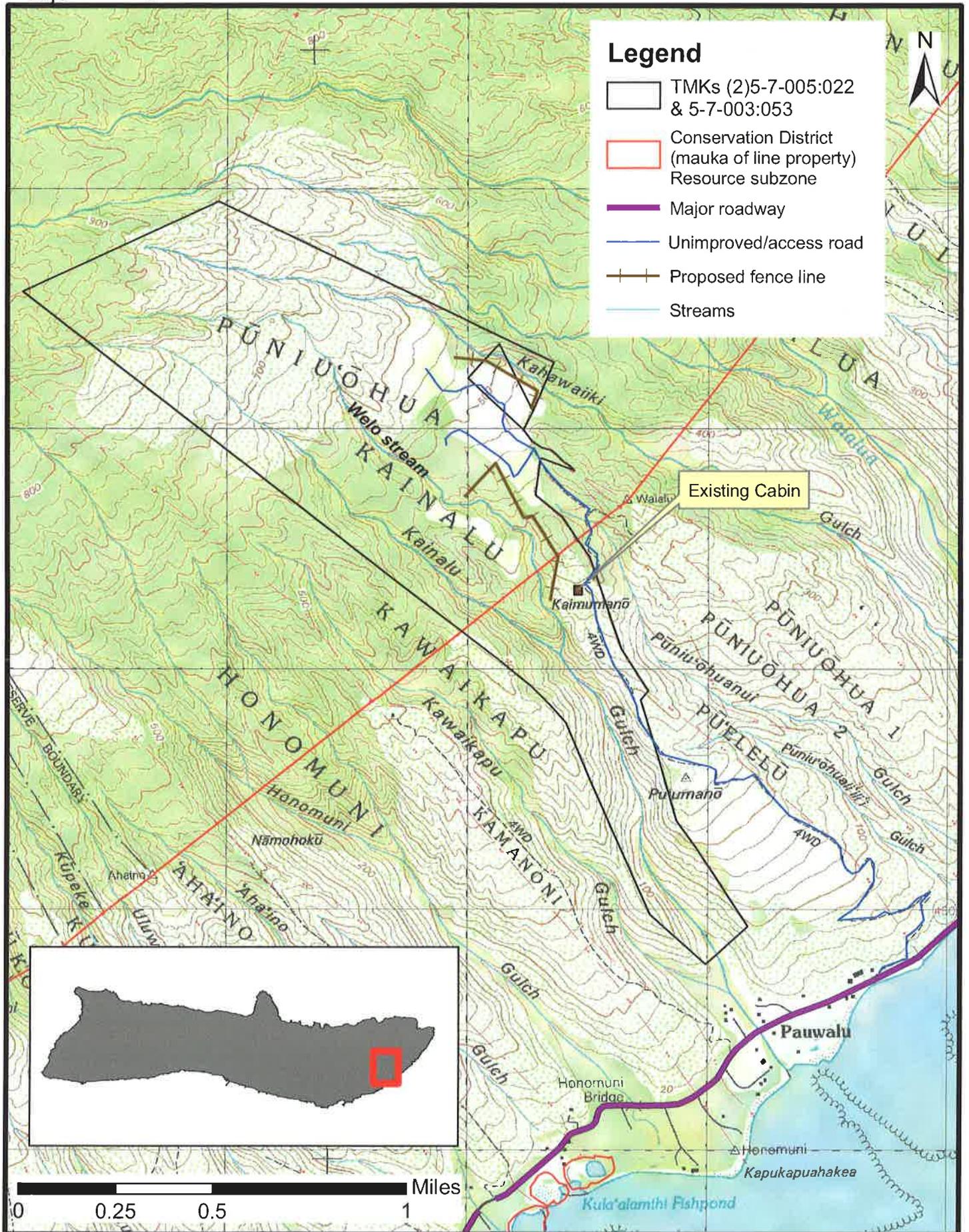
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APPENDIX A

Maps of the Project Area

Kainalu Mesic Forest Restoration Project - Existing Infrastructure, Topography, and Project Area.



APPENDIX B

Fauna Survey of TMK: (2)5-7-005:022

Native species in **bold**

Mammals:

<i>Sus scrofa</i>	pig
<i>Axis axis</i>	Axis or Chital deer
<i>Bos taurus</i>	cow
<i>Herpestes auro punctatus</i>	small Indian mongoose

Birds:

<i>Himatione sanguinea</i>	`apapane
<i>Hemignathus virens</i>	`amakihi
<i>Acridotheres tristis</i>	Common myna
<i>Zosterops japonica</i>	Japanese white-eye
<i>Cettia diphone</i>	Japanese bush-warbler
<i>Cardinalis cardinalis</i>	Northern cardinal
<i>Copsychus malabaricus</i>	White-rumped shama
<i>Streptopelia chinensis</i>	Spotted dove
<i>Zenaida macroura</i>	Mourning dove
<i>Leiothrix lutea</i>	Red-billed leiothrix
<i>Puffinus newelli</i>	a`o, Newell's shearwater
<i>Tyto alba</i>	Barn Owl
<i>Francolinus francolinus</i>	Black Francolin

Invertebrates:

<i>Succinea</i> sp.	Amber snail
<i>Megalagrion calliphya</i>	pina`o `ula,
<i>Megalagrion hawaiiensis</i>	pina`o `ula,
<i>Megalagrion nigrohamatum</i>	pina`o
<i>Anax strenuus</i>	dragonfly
<i>Pantala flavescens</i>	globeskimmer
<i>Atya bisulcata</i>	opae kala`ole; freshwater shrimp
<i>Macrobrachium lar</i>	Tahitian prawn

APPENDIX C

Vascular Flora Inventory of TMK: (2)5-7-005:022

Species of Concern are annotated below by **SOC**.

Other annotations as follows:

SIE = Single Island Endemic

NCN= No Common Name

Endemic: Endemic to Hawai`i; not naturally found elsewhere

Indigenous: naturally occurring in Hawai`i but also elsewhere

Naturalized: Spreading beyond intentional or accidental plantings

Cultivated: Purposely grown but not spreading

Polynesian: Introduced to Hawai`i by the original Polynesian settlers

'?': uncertain distribution status; not enough data at this time for definitive placement

Pteridophytes

Aspleniaceae

Asplenium contiguum	NCN	Endemic
Asplenium nidus	`ekaha	Indigenous
Asplenium lobulatum	pi`ipi`i lau manamana	Indigenous

Athyriaceae

Athyrium microphyllum	`akolea	Endemic
Deparia marginalis	NCN	Endemic
Deparia petersenii	NCN	Naturalized
Diplazium sandwichianum	ho`i`o	Endemic

Blechnaceae

Blechnum appendiculatum	hammock fern	Naturalized
Sadleria cyatheoides	ama`u	Endemic genus
Sadleria squarrosa	apu`u	Endemic genus

Dennstaedtiaceae

Hypolepis hawaiiensis	olua	Endemic
Pteridium aquilinum var. decompositum	kilau	Endemic

Dicksoniaceae

Cibotium glaucum	hapu`u	Endemic
Cibotium menziesii	hapu`u i`i	Endemic

Dryopteridaceae

Ctenitis latifrons	`akolea	Endemic
Dryopteris glabra	kilau	Endemic
Nothoperanema rubiginosa	NCN	Endemic

Gleicheniaceae

Dicranopteris linearis	uluhe	Indigenous
Diplopterygium pinnatum	uluhe lau nui	Indigenous

Grammitidaceae

Adenophorus hymenophylloides	pai	Endemic genus
Adenophorus tamariscinus	wahine noho mauna	Endemic genus
Adenophorus pinnatifidus	NCN	Endemic genus
Grammitis tenella	kolokolo	Endemic

Hymenophyllaceae

Mecodium recurvum	`ohia ku	Endemic
Sphaerocionium lanceolatumpalai	hinahina	Endemic
Sphaerocionium obtusum	palai lau li'i	Endemic
Vandenboschia cyrtotheca	NCN	Endemic
Vandenboschia davallioides	palai hihi	Endemic

Lindsaeaceae

Microlepia strigosa	palapalai	Indigenous
Sphenomeris chinensis	pala`a	Indigenous

Lomariopsidaceae

Elaphoglossum crassifolium	hoe a Maui	Endemic
Elaphoglossum fauriei	hoe a Maui	Endemic
Elaphoglossum pellucidum	hoe a Maui	Endemic

Lycopodiaceae

Huperzia phyllanthus	wawae`iole	Indigenous
Lycopodiella cernua	wawae`iole	Indigenous

Nephrolepidaceae

Nephrolepis cordifolia	NCN	Indigenous
Nephrolepis brownii	scaly sword fern	Naturalized

Psilotaceae

Psilotum complanatum	moa	Indigenous
Psilotum nudum	moa	Indigenous

Polypodiaceae

Lepisorus thunbergianus	pakahakaha	Indigenous
Phymatosorus grossus	laua`e	Naturalized
Polypodium pellucidum	a`e	Endemic

Pteridaceae

Adiantum raddianum	maidenhair fern	Naturalized
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Selaginellaceae

Selaginella arbuscula	lepelepe a moa	Endemic
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Thelypteridaceae

Amauropelta glomulifera	palapalai a Kamapua`a	Endemic
Christella cyatheoides	kikawaio	Endemic
Christella parasitica		Naturalized
Cyclosorus interruptus	neke	Indigenous
Pneumatopteris sandwicensis	ho`i`o kula	Endemic

Gymnosperms

Araucariaceae

Araucaria columnaris	Cook pine	Cultivated
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Pinaceae

Pinus sp. pine Cultivated

Flowering Plants

Dicots

Anacardiaceae

Schinus terebinthifolius Christmas berry Naturalized

Apiaceae

Centella asiatica Asiatic pennywort Naturalized
Hydrocotyle verticillata marsh pennywort Naturalized

Apocynaceae

Alyxia oliviformis maile Endemic

Aquifoliaceae

Ilex anomala kawa`u Indigenous

Araliaceae

Cheirodendron trigynum `olapa Endemic
Schefflera actinophylla octopus tree Naturalized
Tetraplasandra oahuensis `ohe mauka **Endemic genus**

Asteraceae

Ageratum conyzoides maile honohono Naturalized
Ageratina adenophora Maui pamakani Naturalized
Ageratina riparia Hamakua pamakani Naturalized
Elephantopus mollis Elephant's foot Naturalized
Erechtites valerianifolia fireweed Naturalized
Sonchus oleraceus sow thistle Naturalized

Bignoniaceae

Spathodea campanulata African tulip tree Naturalized

Buddleiaceae

Buddleia asiatica butterfly bush Naturalized

Campanulaceae

Clermontia arborescens
 subsp. waikoluensis `oha wai nui **Endemic genus**
Clermontia kakeana `oha wai **Endemic genus**
Clermontia pallida `oha wai **Endemic genus; SIE**
Cyanea solenocalyx pua kala **Endemic genus; SIE; SOC**
Lobelia hypoleuca `opelu Endemic
Trematolobelia macrostachys koli`i **Endemic genus**

Caryophyllaceae

Cerastium fontanum
 subsp. triviale common mouse-eared chickweed Naturalized
Drymaria cordata pipili Naturalized

Casuarinaceae

Casuarina equisetifolia ironwood Cultivated

<u>Celastraceae</u>			
Perrottetia sandwicensis	olomea		Endemic
<u>Convolvulaceae</u>			
Ipomoea alba	moonflower		Naturalized
<u>Ebenaceae</u>			
Diospyros sandwicensis	lama		Endemic
<u>Epacridaceae</u>			
Leptecophylla tameiameia	pukiawe		Indigenous
<u>Ericaceae</u>			
Vaccinium dentatum	`ohelo		Endemic
<u>Euphorbiaceae</u>			
Aleurites moluccana	kukui		Polynesian
Antidesma platyphyllum	hame		Endemic
<u>Fabaceae</u>			
Acacia koa	koa		Cultivated; Endemic
Acacia koaia	koai`a		Cultivated; Endemic; SOC
Desmodium incanum	Spanish clover		Naturalized
Leucaena leucocephala	koa haole		Naturalized
Lotus uliginosus	NCN		Naturalized
Samanea saman	monkeypod		Cultivated
<u>Gesneriaceae</u>			
Cyrtandra biserrata	ha`iwale		Endemic; SOC
Cyrtandra grayana	ha`iwale		Endemic
Cyrtandra grayi	ha`iwale		Endemic
Cyrtandra halawensis	ha`iwale		Endemic; SIE ; SOC
Cyrtandra hawaiiensis	ha`iwale		Endemic
Cyrtandra procera	ha`iwale		Endemic; SIE
<u>Goodeniaceae</u>			
Scaevola chamissoniana	naupaka kuahiwi		Endemic
<u>Hydrangeaceae</u>			
Broussaisia arguta	kanawao		Endemic genus
<u>Lamiaceae</u>			
Stenogyne kamehamehae	NCN		Endemic genus
<u>Lauraceae</u>			
Cassytha filiformis	kauna`oa		Indigenous
Cinnamomum camphora	camphor		Cultivated; Naturalized?
<u>Loganiaceae</u>			
Labordia hedyosmifolia	kamakahala		Endemic genus
Labordia waiolani	kamakahala		Endemic genus
<u>Lythraceae</u>			
Cuphea carthagenesis	tarweed		Naturalized
Lythrum maritimum	pukamole		Naturalized

Malvaceae

Abutilon grandifolium	hairy abutilon	Naturalized
Sida fallax	`ilima	Indigenous
Sida rhombifolia	NCN	Naturalized?

Melastomataceae

Clidemia hirta	Koster's curse	Naturalized
Pterolepis glomerata	false meadow beauty	Naturalized
Tibouchina herbacea	cane tibouchina	Naturalized

Moraceae

Artocarpus altilis	ulu; breadfruit	Polynesian
Ficus microcarpa	Chinese banyan	Naturalized

Myrtaceae

Eucalyptus robusta	swamp mahogany	Cultivated; Naturalized
Metrosideros polymorpha var. glaberrima	`ohi`a lehua	Endemic
Metrosideros polymorpha var. incana	`ohi`a lehua	Endemic
Metrosideros waialealae var. faurei	`ohi`a lehua	Endemic
Psidium cattleianum	strawberry guava	Naturalized
Psidium guajava	common guava	Naturalized
Syzygium cumini	Java plum	Naturalized
Syzygium jambos	rose apple	Naturalized
Syzygium malaccense	`ohi`a ai	Polynesian
Syzygium sandwicensis	`ohi`a ha	Endemic

Ochnaceae

Ochna thomasiiana	Mickey Mouse plant	Naturalized
Sauvagesia erecta	Creole tea	Naturalized

Oleaceae

Nestegis sandwicensis	olopua	Endemic
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Onagraceae

Ludwigia octovalvis	primrose willow	Polynesian?
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Oxalidaceae

Oxalis corniculata	yellow wood sorrel	Polynesian?
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Piperaceae

Peperomia alternifolia	`ala`ala`wai nui	Endemic
Peperomia blanda var. floribunda	`ala`ala`wai nui	Indigenous
Peperomia cookiana	`ala`ala`wai nui	Endemic
Peperomia expallescens	`ala`ala`wai nui	Endemic
Peperomia latifolia	`ala`ala`wai nui	Endemic
Peperomia macraeana	`ala`ala`wai nui	Endemic
Peperomia tetraphylla	`ala`ala`wai nui	

Pittosporaceae

Pittosporum glabrum	ho`awa	Endemic
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Polygonaceae

Persicaria glabra	kamole	Naturalized?
Rumex giganteus	pawale	Endemic
<u>Rhamnaceae</u>		
Colubrina asiatica	`anapanapa	Indigenous
<u>Rosaceae</u>		
Osteomeles anthyllidifolia	`ulei	Indigenous
Rubus rosifolius	thimbleberry	Naturalized
<u>Rubiaceae</u>		
Bobea elatior	`ahakea lau nui	Endemic genus
Coffea arabica	coffee	Naturalized
Coprosma pubens	pilo	Endemic
Kadua affinis	manono	Endemic
Kadua centranthoides	NCN	Endemic
Morinda citrifolia	noni	Polynesian
Nertera granadensis	makole	Indigenous
Psychotria mariniana	kopiko	Endemic
Psychotria kuduana	kopiko kea	Endemic
Psydrax odorata	alahe`e	Indigenous
<u>Rutaceae</u>		
Melicope clusiifolia	kolokolo mokihana	Endemic
Melicope cf reflexa	alani	Endemic; SIE; E
<u>Solanaceae</u>		
Solanum capsicoides	cockroach berry	Naturalized
Solanum linneanum	Apple of Sodom	Naturalized
<u>Sterculiaceae</u>		
Waltheria americana	`uhaloa	Indigenous?
<u>Thymelaeaceae</u>		
Wikstroemia sp.	`akia	Endemic
<u>Urticaceae</u>		
Pipturus albidus	mamaki	Endemic
Pilea peploides	NCN	Indigenous
Touchardia latifolia	olona	Endemic genus
<u>Verbenaceae</u>		
Stachytarpheta urticifolia		Naturalized
<u>Monocots</u>		
<u>Agavaceae</u>		
Cordyline fruticosa	ti; ki	Polynesian
<u>Araceae</u>		
Colocasia esculenta	kalo; taro	Polynesian
<u>Arecaceae</u>		
Pritchardia munroi	loulu lelo	Cultivated; SIE; USF&WS:
Endangered		

Commelinaceae

Commelina diffusa spreading day flower Naturalized

Cyperaceae

Carex alligata NCN Endemic
Carex meyenii NCN Indigenous
Cyperus polystachyos NCN Indigenous
Cyperus sphaecelatus roadside flatsedge Naturalized
Eleocharis obtusa kohekohe Indigenous
Kyllinga brevifolia kili`o`opu Naturalized
Machaerina angustifolia `uki Indigenous
Machaerina mariscoides
 subsp. meyenii `ahaniu Endemic
Rhynchospora chinesis
 subsp. spiciformis kuolohia Indigenous

Dioscoreaceae

Dioscorea bulbifera hoi Polynesian
Dioscorea pentaphylla pi`a Polynesian

Juncaceae

Juncus planifolius rush Naturalized

Liliaceae

Astelia menziesiana kaluaha Endemic

Musaceae

Musa x paradisiaca mai`a; banana Polynesian

Orchidaceae

Spathoglottis plicata Philippine ground orchid Naturalized

Pandanaceae

Freycinetia arborea `ie`ie Indigenous

Poaceae

Andropogon virginicus broomsedge Naturalized
Axonopus compressus wide-leaved carpetgrass Naturalized
Axonopus fissifolius narrow-leaved carpetgrass Naturalized
Oplismenus hirtellus basketgrass Naturalized
Paspalum conjugatum Hilo grass Naturalized
Pennisetum purpureum California grass Naturalized
Sacciolepis indica Glenwood grass Naturalized
Setaria parviflora yellow foxtail Naturalized

Smilacaceae

Smilax melastomifolia hoi kuahiwi Endemic

Zingiberaceae

Hedychium coronarium white ginger Naturalized

APPENDIX D

Photographs

Kainalu Mesic Forest Restoration—Riparian gulch areas



Kainalu Mesic Forest Restoration—Ungulate damage near stream area



Kainalu Mesic Forest Restoration—Pasture area, staging area for fence construction



Kainalu Mesic Forest Restoration—Vegetation around fence line

