LINDA LINGLE
GOVERNOR OF HAWAII

MAY 23 2010

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 3, 2010

Katherine Kealoha, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

RE: Finding of No Significant Impact (FONSI) for The Wainiha Conservation Project, Island of Kaua'i

Dear Ms. Kealoha:

The Department of Land and Natural Resources Division of Forestry and Wildlife has reviewed the comments received during the 30-day public comment period which began on February 23 2010. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the next available OEQC Environmental Notice.

On the enclosed CD please find the OEQC Publication Form and a PDF copy of the Final EA. Attached are ~~two~~ one hard copies of the Final EA. Please call Lisa Ferentinos at 586-0917 if you have any questions.

Sincerely,

Paul J. Conry
Administrator

FINAL ENVIRONMENTAL ASSESSMENT
FOR
THE WAINIHA CONSERVATION PROJECT

This document prepared pursuant to Chapter 343, HRS

Prepared by
The Nature Conservancy, acting by and through its Hawai‘i Chapter,
Kaua‘i Program, for the benefit of the Kaua‘i Watershed Alliance

2010

Photo: Ken Wood, 2009

FINAL ENVIRONMENTAL ASSESSMENT
THE WAINIHA CONSERVATION PROJECT

TABLE OF CONTENTS

I. INTRODUCTION: FINAL ENVIRONMENTAL ASSESSMENT 3
II. SUMMARY OF PROPOSED ACTIONS 5
- **A. Project Purpose and Need** 6
- **B. Project Description and Location** 8
- **C. Schedule** 14
  - **i. Fence Corridor Clearing** 14
  - **ii. Fence Installation** 14
  - **iii. Weatherport Installation** 15
  - **iv. Inspections and Maintenance** 15
  - **v. Ungulate Control** 15
  - **vi. Weed Control** 15
- **D. Funding Sources** 15

III. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT 16
- **A. General** 16
- **B. Flora and Fauna** 16
- **C. Cultural Resources** 17
  - **i. Cultural Impact Assessment** 17
  - **ii. Archaeological Assessment** 18
- **D. Sensitive Habitat** 18
- **E. Other Uses** 20

IV. SUMMARY OF MAJOR IMPACTS 20
- **A. Major Positive Impacts** 20
- **B. Major Negative Impacts** 21

V. PROPOSED MITIGATION MEASURES 22
- **A. Vegetation and Soil Disturbance** 22
- **B. Weed Introductions** 22
- **C. Ground Nesting Seabirds and Bats** 23
- **D. Streams** 24
- **E. Cultural Access** 24

VI. ALTERNATIVES CONSIDERED 24
- **A. Alternative: No Action** 24

VII. ANTICIPATED DETERMINATION 24
VIII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION 24
IX. PERMITS REQUIRED 27
X. EA PREPARATION 27
XI. REFERENCES CITED 29

FINAL ENVIRONMENTAL ASSESSMENT
THE WAINIHA CONSERVATION PROJECT

I. INTRODUCTION: FINAL ENVIRONMENTAL ASSESSMENT

Project Name: Wainiha Conservation Project

Proposing Agency: Kaua‘i Watershed Alliance c/o The Nature Conservancy in Hawai‘i, Kaua‘i Program

Approving Agency: State Department of Land and Natural Resources (DLNR)

Project Location: Wainiha

McBryde Sugar Company, Limited
TMK: 4-5-8-001-001

Property Owner(s): McBryde Sugar Company, Limited

State Land Use Classification: Conservation District Protective Subzone

Anticipated Determination of Environmental Assessment:

A Finding of No Significant Impact (FONSI) is expected for the project.

Agencies and parties consulted during Draft and Final EA Preparation included:

Federal: U.S. Department of Interior
U.S. Fish & Wildlife Service

State: Department of Hawaiian Home Lands
Department of Land and Natural Resources
Division of Forestry and Wildlife
Division of Historic Preservation
Office of Hawaiian Affairs

Kaua‘i County: Planning Department
Department of Water

Private: A & B Properties, Inc., Property Manager
McBryde Sugar Company, Ltd.
Gay and Robinson, Inc.

Grove Farm Company, Incorporated
Kamehameha Schools
Kaua‘i Ranch, LLC
Lihu‘e Land Company
Ben A. Dyre Family LP
National Tropical Botanical Garden
Princeville Utilities

(See Exhibit I: Consulted Agencies & Parties Pre-Assessment Distribution List for a complete list and Exhibit K for a complete Draft EA Distribution List and Exhibit M for received comment letters.)

Changes to the Draft EA found in the Final EA

Information was added in response to the letters received from The State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service, which added details to the weed prevention protocol, removal of the weatherports, placement of the waterbars, listing of PEP species, weaving of polytape for fence visibility, dead seabird and bat protocol. Table 1 and the Sensitive Habitat section were updated to include information from the Department of the Interior Fish and Wildlife Service Federal Register/Vol.75, No.70/Tuesday, April 13, 2010 adding information on the 48 newly listed species found only on the island of Kaua‘i.

All of these changes have been underlined in the text.

II. SUMMARY OF PROPOSED ACTIONS

The Nature Conservancy (TNC), with the approval of the landowner; McBryde Sugar Company, Limited (McBryde), proposes to construct a protective hog wire fence to prevent ingress of feral ungulates into the Wainiha Preserve. Upon completion of the fence, TNC will conduct ungulate control and monitoring activities to eliminate feral ungulates from within the fenced area. These activities, along with invasive plant survey and control work, will preserve the existing healthy structure and function of the Wainiha watershed and native Hawaiian forest ecosystem.

In April 2003, state and private landowners formed the Kaua‘i Watershed Alliance (KWA). The KWA members continue to recognize that cooperation is the key to a timely and successful watershed management program that will protect Kaua‘i’s watershed from invasive alien animals, plants, and other threats.

The objective of this project is to protect and preserve approximately 7,050 acres (ac) of irreplaceable watershed and unique native ecosystem, as well as the rare and endangered species it supports. The project will be located in the Wainiha Preserve on the windward side of Kaua‘i.

To obtain approval for such a project on conservation district land, a conservation district use permit application (CDUA) package will be developed which includes a CDUA application, draft environmental assessment, and a management plan. The package shall be submitted to the Board of Land and Natural Resources for determination and permit approval.

The proposed protective fence will be approximately 489 meters (.3 miles or 1,604 ft) in length, and will work in conjunction with vertical cliffs and natural barriers to protect approximately 7,050 ac of McBryde land located in the Conservation District. If needed additional wing fences, along natural barriers, could be added to manage the area effectively, as well as Radio Repeaters to increase crew safety and communications. (*See Exhibit A: Project Location map*).

The project will involve the clearing of vegetation, several inches above ground level, from up to a 10 ft wide corridor along the length of the proposed fence alignment using small power and hand operated machinery (i.e., handsaw, pick ax, weed eater, chainsaw). A 48 inch (in) high fence will be constructed using wire mesh or standard hog panels supported by T-posts. *(See Exhibit B: Fence Construction example)*

To provide weather protection and safety for workers during natural resource management activities, up to 3 weatherports will be assembled. The weatherports will consist of a pre-

fabricated weather shelter that is assembled on a raised platform. The shelter will be an 8 ft high octagon, with a radius of 20ft. *(See Exhibits A & C: Project Location map & Weatherport example)* The following human waste disposal protocol will be followed in order to prevent stream contamination or the breeding of mosquitoes: a 3 to 4 ft deep hole will be dug and human waste, enclosed in compostable bags, will be covered in either agricultural lime or *Bacillus thuringiensis* pellets before being filled in with dirt at the end of each field trip.

After fence and weatherport construction, the project will consist of natural resource management activities such as feral pig and goat monitoring and removal, invasive weed control, fence maintenance, and monitoring to track the recovery of native plant populations.

The anticipated start date for this project is the second quarter of Fiscal Year 11 (Oct 2010 – Dec 2010) and once initiated, all phases of the project will be completed within 12 months.

Fundraising for the project will commence upon approval of the Conservation District Use Permit.

A. Project Purpose and Need

The proposed project area falls under the Hawai‘i Administrative Rules (HAR) Conservation District Protective subzone. This HAR §13-5-11 designation is used "to protect valuable resources in designated areas such as restricted watershed, marine, plant, and wildlife sanctuaries, significant historical, archaeological, geological, and volcanological features and sites, and other designated unique areas." The Protective subzone as stated in the law encompasses the protection of watersheds, water sources, and water supplies.

The Wainiha Conservation Project was conceived and planned to protect and preserve one of the best examples of native lowland wet forest remaining in the state. The valley contains 127 endemic Hawaiian plant species, 41 of which are only found on Kaua‘i. The upper valley contains one of the largest populations of the rarely-found endemic Laua‘e fern which is referred to in many Kaua‘i chants. The native mint, *Phyllostegia helleri*, had once been thought to be extinct, was rediscovered at Hinalele Falls in this valley in 2004 by Ken Wood of the National Tropical Botanical Garden. Other species of interest found in the valley are the endangered *Cyrtandra cyaneoides* and *Plantago princeps var. logibracteata.*

In July 2009, the flora of the Wainiha preserve was estimated to be composed of some 281 taxa of vascular plants from 75 families. This includes 222 native taxa, 51 non-native naturalized species, and 8 Polynesian introductions. Of the 222 native plant species naturally occurring within the Wainiha preserve region, it was found that 177 are endemic and 45 are considered indigenous. The Wainiha preserve contains 63 Kaua‘i single island endemic (SIE) taxa which is 28% of the entire 225 SIE taxa unique to

Kaua‘i. This high level of endemism clearly demonstrates the floristic uniqueness, diversity, and importance of the region *(Wood, 2009).*

The Wainiha preserve also supports a diverse assemblage of native Hawaiian animals, many of which are federally listed as endangered species or are candidates for listing as endangered species. Common forest bird species include Kaua‘i ‘Amakihi (*Hemignathus kauaiensis*), ‘Apapane (*Himatione sanguinea*), and ‘Elepaio (*Chasiempis sandwichensis*). Ground nesting sea birds including the White-tailed Tropicbird (*Phaethon lepturus*), the endangered Hawaiian Petrel *(Pterodroma sandwichensis),* and the threatened Newell Shearwater *(Puffinus auricularis newelli)* also nest in Wainiha. The Wainiha River itself is home to a number of native Hawaiian species of fish, insects, mollusks and waterfowl, including the endangered Koloa duck *(Anas wyvilliana).*

The natural communities of Wainiha are valuable, not only for the many rare and endangered species that they contain, but also for the ecosystem services which they provide. The KWA recognizes several crucial functions these ecosystems perform related to maintaining a source of high quality water. The forests and riparian areas act as a living sponge, soaking up rainfall, reducing erosion, and increasing infiltration. These buffers then slowly release stored water into streams, mitigating the effects of flood and drought cycles while providing clean, consistent stream flow. Preservation of the structure and function of the Wainiha river watershed is required in order to maintain biodiversity within the river ecosystem, ensure adequate water supply for human uses downstream, and ultimately protect coastal reefs and marine resources from siltation.

As coordinators for the KWA, TNC’s management activities focus on preserving watershed function and overall ecosystem health. The KWA management plan (as well as analyses conducted by numerous other state and federal agencies and academic institutions) has identified the impacts of feral ungulates and invasive weeds as the greatest threats to both biodiversity and watershed function. While most of Wainiha is dominated by native vegetation, many of the major and tributary stream corridors and riparian areas are currently being impacted by feral ungulates and invasive weeds.

Invasive weed species such as Australian tree fern, strawberry guava, and Kahili ginger pose a particularly grave danger to the forest due to their ability to create dense, monotypic populations in previously undisturbed native forest. These monotypic populations increase soil erosion and stream sedimentation due to their inability to absorb surface runoff and retain soil as efficiently as diverse native forest. These weeds not only damage watershed function, but also degrade the quality of wildlife habitat in downstream riparian and reef ecosystems by increasing siltation. *(Hawaii’s Comprehensive Wildlife Conservation Strategy (HCWCS), 2005).*

Feral pigs (*Sus scrofa*) directly threaten native plant diversity by indiscriminately consuming native understory vegetation. One study, analyzing the stomach contents of feral pigs in Hawai‘i, found that the majority (70-95%) of identifiable material was Hapu‘u (*Cibotium glaucum),* the Hawaiian tree fern (*Cooray and Mueller-Dombois, 1981*). Similar studies have found that feral pigs carry parasites such as fleas, lice,

hookworms, tapeworms and trichinae (which is a source of trichinosis in humans) as well as various diseases such as typhus, leptospirosis, tuberculosis, and brucellosis which are transmittable to humans *(Warner, 1959 – 1969)*. Feral pigs also damage watersheds by disturbing topsoil with their rooting behavior. This behavior exposes soil to erosion, spreads root-rot fungi to native species, and creates the ideal habitat for invasive alien weed seeds that pigs transport either on their body or within their digestive tract. Studies conducted in similar wet forests in Hawai‘i have shown a direct correlation between the increase of alien plants and pig-induced soil disturbance *(Aplet et al, 1991)*. Digging, rooting and wallowing by pigs also fallows the forest floor, creating rainwater receptacles which later serve as prime mosquito breeding areas *(Baker, 1979)*. Avian malaria, a mosquito-borne disease, has played a significant role in the extinction of a number of native Hawaiian forest bird species. Any attempt to preserve the health and integrity of this vital watershed must first address the threats posed by feral ungulates.

Decades of research and resource management in Hawai‘i verify that the only successful method of completely protecting an area from feral pigs is to exclude the animals with wire mesh fences. Once pigs are removed, native Hawaiian ecosystems are capable of recovering on their own *(Jacobi, 1976)*. A five year study conducted in montane wet forest on the Big Island recorded a dramatic increase in native understory vegetation within an ungulate exclosure, while there was no reestablishment of these plants where pig activity continued outside the fence *(Katahira, 1980)*. Another study compared the vegetation structure inside and outside a 13 year old pig exclosure located in Hawai‘i Volcanoes National Park. The forest inside the fence showed an increase in native species diversity and population size, while outside the fence the number and density of alien species increased over the period of the study *(Higashino and Stone, 1982)*.

B. Project Description and Location

The Nature Conservancy’s Wainiha preserve is located 5 miles from the nearest human development, in one the most remote and pristine areas of the state. The extremely rugged topography has isolated it from adjacent watersheds and human development near the mouth of the valley. Due to its’ relative inaccessibility, the native-dominated ecosystems in this area have remained sheltered from deforestation, overgrazing, introduction of numerous invasive weeds and other threats that have degraded ecosystems throughout Hawai‘i. Though damage done to the forests by Hurricanes ‘Iwa and ‘Iniki have given some invasive species a foothold in this area, continued conservation efforts will help safeguard the rich, abundant resources for future generations *(HCWCS, 2005)*.

The topography of Wainiha makes it a natural fortress against feral ungulates. Several near-vertical pali two thousand feet tall, surround the valley on three sides, effectively restricting the movement of feral pigs and goats in and out of the management unit. The only route for these animals to enter the back of Wainiha is by following the narrow strip of traversable land along the stream corridor. TNC has conducted extensive topographical analysis, as well as both aerial and on-the-ground surveys, to identify the best location for

a protective fence that will span the stream corridor and connect the two pali on either side of the river to create an impenetrable barrier against feral ungulates. The fence will not continue across the stream but create barriers on either side of the gorge, effectively halting pig traffic through the area.

The upper drainages and forested slopes of Wainiha have been described as being dominated by a native tree canopy of *Metrosideros polymorpha* var. *glaberrima* (‘ōhi‘a), which average around 12 m (40 ft) in height. Occasionally in the less steep regions, *Syzygium sandwicensis* (‘ōhi‘a hā) becomes the dominant along with *Antidesma platyphyllum* (hame). Some open sections along the forested banks of streams can also be dominated by *Aleurites moluccana* (kukui) and interspersed with *Pisonia umbellifera* (pāpala kēpau). Common understory trees include *Psychotria mariniana & P. hexandra* (kōpiko), *Scaevola procera* (naupaka kuahiwi), *Kadua affinis* (manono), *Dubautia knudsenii* (na‘ena‘e), *Broussaisia arguta* (kanawao), and several species of *Myrsine* (kōlea). Along streams a predominance of Urticaceae occur, including *Boehmeria grandis* (‘ākōlea), several species of *Pipturus* (māmaki), and the monotypic genus *Touchardia* (olonā). Additional less common associate trees include *Ilex anomala* (kāwa‘u), along with several species of *Cheirodendron* (‘ōlapa), *Cyanea* (hāhā), *Melicope* (alani) and *Labordia* (kāmakahala). Understory riparian herbs and shrubs include many representatives of *Cyrtandra* (ha‘iwale) and *Peperomia* (‘ala‘ala wai nui). Common terrestrial sedges throughout this region include species of *Machaerina* (‘uki or ‘ahaniu) along with several species of vigorous sedges within the genus *Gahnia (Wood, 2009). (See Exhibit D: Critical & Rare Resources map)*

The composition of understory riparian ferns in Wainiha are similar to several of the adjacent north Kaua‘i wet valleys and include the dominant *Diplazium sandwichianum* (hō‘i‘o), along with *Christella cyatheoides* (kikawaiō), and several species of *Asplenium, Sadleria* (‘ama‘u), and *Cibotium* (hāpu‘u). In many areas, especially along the steeper drainage walls, the upper stream banks and ridges become dominated by the indigenous matting ferns *Dicranopteris linearis* (uluhe) and *Diplopterygium pinnatum* (uluhe lau nui). Occasionally one can observe the endemic matting fern, *Sticherus owhyhensis* (uluhe or unuhe), along the banks of streams. Epiphytic and lithophytic *Hymenophyllaceae* and *Grammitidaceae* are common in the forest understory and include several species of *Adenophorus* (wahine noho mauna). These delicately beautiful ferns are often matting the trunks of trees and are associated with epiphytic mosses. *Adenophorus*, along with tree-fern species of *Sadleria* represent distinct genera restricted to the Hawaiian Islands *(Wood 2006a).* It should be noted that the back of Wainiha Valley has a significant population of *Microsorum spectrum* var. *pentadactylum* (pe‘ahi or laua‘i), a maile-scented fern used traditionally for hula *(Wood 2007).*

Table 1: Checklist of Rare Taxa with Federal Status, PEP Desgination and Population Estimates

Wainiha Preserve, Kaua`i, Hawai`i

Note: Checklist alphabetical by genus. Symbols: C=Candidate for Listing; E=Endangered; EX=Extinct; H=Historical & no longer present; SOC=Species of Concern; T=Threatened. Flowering plants follow Wagner et al. 1999; pteridophytes follow Palmer 2003.PEP = Plant Extinction Program species

GENUS	*SPECIES*	*COMMON NAME*	*FEDST/ PEP DES*	*# OF PLANTS*
Adenophorus	periens L.E.Bishop	palai lāʻau	end, E /PEP	ca. 32
Anoectochilus	sandvicensis Lindl.	jewel orchid	end, SOC	ca. 100+
Astelia	waialealae	painiu	E/PEP	*
Bidens	campylotheca Sch.Bip.	koʻokoʻolau, koʻolau	end, SOC	ca. 500
Bidens	valida Sherff subsp. nov.	koʻokoʻolau, koʻolau	end, SOC	ca. 100
Chamaesyce	remyi (A.Gray ex Boiss.) Croizat & O.Deg. var. kauaiensis (O.Deg. & Sherff) O.Deg. & I.Deg.	ʻakoko, koko, ʻekoko, kōkōmālei	end, E	ca. 500
Cheirodendron	dominii	olapa, lapalapa	SOC	*
Christella	wailele (Flynn) D.D.Palmer		end, SOC	ca. 30
Cyanea	recta (Wawra) Hillebr.	Hāhā	end, T	ca. 1000-1200
Cyrtandra	cyaneoides Rock	māpele, haʻiwale, kanawao keʻokeʻo	end, E	ca. 500
Cyrtandra	kamoolaensis H. St. John	haʻiwale	end, SOC	ca. 500
Cyrtandra	kealiae Wawra	haʻiwale, kanawao keʻokeʻo	end, T	ca. 500
Cyrtandra	limahuliensis	haʻiwale, kanawao keʻokeʻo	end, SOC	ca. 100
Cyrtandra	oenobarba H.Mann	haʻiwale, kanawao keʻokeʻo	end, C	ca. 50
Cyrtandra	pickeringii A.Gray	haʻiwale, kanawao keʻokeʻo	end, SOC	ca. 100
Dryopteris	crinalis var. podosorus	palapalai amumakua	E	*
Dubautia	imbricaata subsp. acronaea	naenae, kupaoa	SOC	*
Dubautia	knudsenii Hillebr. subsp. filiformis G.D.Carr	naʻenaʻe, kūpaoa	end, SOC	ca. 100
Dubautia	waialealae	naenae	E	*
Eurya	sandwicensis	anini, wanini	SOC	*
Exocarpos	luteolus	heau, au	E	*
Geranium	kauaiense	Nohoanu, hinahina	E	*
Hillebrandia	sandwicensis Oliv.	pua maka nui, akaʻakaʻawa (Kauaʻi)	end, SOC	ca. 10
Isodendrion	longifolium A.Gray	Aupaka	end, T	ca. 50

GENUS	*SPECIES*	*COMMON NAME*	*FEDST/ PEP DES*	*# OF PLANTS*
Kadua	elatior (H.Mann) W. L. Wagner & Lorence	‘uiwi (Moloka‘i), ‘āwiwi	end, SOC	ca. 300+
Kadua	tryblium (D.R.Herbst & W.L.Wagner) W. L. Wagner & Lorence		end, SOC	ca. 2000+
Keysseria	erici		E	*
Keysseria	helenae		E	*
Labordia	helleri	kāmakahala	E	*
Labordia	pumila	kāmakahala	E	*
Labordia	tinifolia A.Gray var. wahiawaensis H.St.John	kāmakahala	end, E /PEP	ca. 4
Lobelia	kauaensis	pue	SOC	*
Lobelia	villosa		SOC	*
Lysimachia	daphnoides	lehua makanoe	E	*
Melicope	cruciata	pilo ula	SOC	*
Melicope	degeneri (B.C.Stone) T.G.Hartley & B.C.Stone	alani, alani kuahiwi	end, C /PEP	ca. 9
Melicope	paniculata (H.St.John) T.G.Hartley & B.C.Stone	alani, alani kuahiwi	end, E	ca. 5
Melicope	puberula (H.St.John) T.G.Hartley & B.C.Stone	alani, alani kuahiwi	end, E	ca. 10
Myrsine	fosbergii	kolea	C	*
Myrsine	mezii	kolea	E	*
Panicum	lineale H.St.John		end, SOC	ca. 1000+
Phyllostegia	helleri Sherff		end, SOC	ca.10
Phyllostegia	renovans W.L.Wagner		end, SOC /PEP	ca. 20
Plantago	princeps Cham. & Schltdl. var. longibracteata H.Mann	laukahi kuahiwi, ale	end, E	ca. 200
Platydesma	rostratar	pilo kea lau lii	E	*
Pritchardia	limahuliensis H. St. John	Loulu	end, E	ca. 50
Pritchardia	perlmanii Gemmill	Loulu	end, SOC	ca. 20
Psychotria	wawrae	kopiko	SOC	*
Schiedea	membranacea H.St.John		end, E	ca. 35
Schiedea	lychnoides	kauawawaenohu	E	*
Stenogyne	kealiae Wawra		end, E /PEP (proposed)	ca. 10
Tetraplasandra	kavaiensis (H.Mann) Sherff	‘ohe‘ohe	end, SOC	ca. 300

GENUS	*SPECIES*	*COMMON NAME*	*FEDST/ PEP DES*	*# OF PLANTS*
Zanthoxylum	dipetalum H.Mann	kāwaʻu, kāwaʻu kua kuku kapa	end, SOC	ca. 100

(Ken Wood, Wainiha Biological Survey, 2009) *indicates USFWS additional listings and/or changed status.

A botanical survey along the proposed fence line, which is designed to protect the upper Wainiha Stream and forest region above ca. 365 m [1200 ft] elevation from the destructive presence of non-native feral ungulates, particularly pigs, was carried out in April 2009. There were no rare plant taxa observed on this proposed fence line *(Wood, 2009).* Seabird surveys conducted by the Kauaʻi Endangered Seabird Recovery Project during the 2009 nesting season documented the absence of any colonies along the fence alignment. The project supports the goals and objectives from Seabird Recovery plans outlined in the 2005 Newell Shearwater Five Year Plan *(NESH Working Group, 2005),* the 2005 USFWS Seabird Conservation Plan *(USFWS, 2005)* and the Department of Land and Natural Resources, Hawaiʻis Comprehensive Wildlife Conservation Strategy *(HCWCS, 2005).*

The fence line passes through a 30–50% cover of *Metrosideros polymorpha* lowland wet forest. Riparian sections of stream bank where the fence line passes can be somewhat level to moderately steep and dominated by non-native understory trees of *Psidium guajava* and *Aleurites moluccana* and interspersed with common native tree components such as *Pisonia umbellifera, Antidesma platyphyllum* var. *hillebrandii, Ilex anomala, Psychotria mariniana,* and *Kadua affinis*. Moving further from the stream toward the valley walls, the proposed fence line rises up through very steep open slopes dominated by matting native ferns of *Dicranopteris linearis* & *Diplopterygium pinnatum* with occasional *Metrosideros* forest patches dominated by understory ferns of *Microlepia strigosa* & *Sphenomeris chinensis (Wood, 2009)*. This area is wet, with an average annual rainfall of 160–200 inches. The soil on the banks of the Wainiha Stream are classified as Kolokolo extremely stony clay loam, which is found on stream bottoms with soils that are classified as rough mountainous land and described as "very steep land broken by numerous intermittent drainages" *(Foote, et al,1972).*

The project area will be located in the Wainiha Preserve and will enclose approximately 7,050 ac of McBryde land, located in the Conservation District (TMK 4-5-8-001-001). Adjacent parcels are Kamehameha Schools (TMK 4-5-7-001-001) and State of Hawaiʻi (TMK 4-1-4-001-003), Robinson Family Partners (TMK 4-5-8-002-002 & 4-1-7-001-001). (*See Exhibit E: Vicinity & Parcel map*)

The project will involve the clearing of vegetation, several inches above ground level, from up to a 10 ft wide corridor along the proposed fence alignment using small power and hand operated machinery (i.e., handsaw, pick ax, weed eater, chainsaw). The length of the fence shall be approximately 489 meters (.3 miles or 1,604 ft) in length. It will be 48 inches high and be constructed using hog wire fence fabric or standard hog panels supported by galvanized pipes and fence posts. As necessary, the outside of the fence will be skirted along the base with a hog wire apron laid horizontally along the ground to

prevent pigs from digging underneath. The skirting will be 48 inches wide and be made out of Bezinal coated hog wire. *(See Exhibit B: Example of Fence Construction)* The top strand of fence wire will be woven with one inch electric polytape to increase visibility of the fence for seabirds.

A landing zone, used for the transportation of materials, will be located along the fence line requiring minimal additional clearing. The contractor will select a helicopter company to work with which will determine which airport will be utilized. The number of the trips required to construct the fence will be dependent upon the weight and amount of equipment and supplies which need to be flown to the work sight. It is estimated that 10 sling loads will be required to transport fence materials to the project site. *(See Exhibit F: Pig Control Map)*

After construction, the project will consist of natural resource management activities such as feral pig and goat removal, invasive weed control, fence maintenance, and monitoring to track the recovery of the plant community.

Baiting and trapping will be the primary method of ungulate control employed throughout the fenced preserve. Circular silo traps will be constructed in areas showing high ungulate activity. These traps will be constructed of 1.5 meter high welded mesh walls, with an interior diameter of, about 4.5 meters. The door of the traps will be a push through design. An internal mesh skirt attached at the base of the trap will prevent pigs from tunneling out of the trap. The open top and natural ground floor employed in this design will minimize stress on the animals. *(See Exhibits F & G: Pig Control map & Silo Trap and Feeder diagrams)*

Automated bait stations will be installed inside each of the traps, either suspended from a tree above the trap or mounted on a tripod inside. The feeders will be baited with a two week's supply of cracked corn, macadamia nuts or other baits as needed.

For the first 3 to 5 weeks of the project the traps will be kept open, in order to allow the resident pigs to grow accustomed to entering the traps and feeding. The traps will then be set and checked the following day to remove the captured pigs.

Due to the remote locations involved in the project, the traps will be positioned and baited by helicopter. Trap placement will take advantage of existing openings in the forest canopy and shrub layer wherever possible. *(See Exhibit F: Pig Control)* In some cases, altering native vegetation may be necessary for either helicopter access or trap placement. Areas previously disturbed by pigs will be used for trap placement wherever possible. In previous uses this trap design has caused only minimal ground disturbance. *(See Exhibit G: Silo Trap and Feeder diagrams)*

To provide weather protection and safety for workers during natural resource management activities, up to 3 weatherports will be assembled. The weatherports will consist of a pre-fabricated weather shelter that is assembled on a raised wooden platform. The approximate size of the shelter will be 20 ft wide by 20 ft long and 8 ft high. The

locations of these shelters will be carefully selected to minimize disturbance to native plants. Areas already converted to non-native grass and weeds by feral ungulates will be considered first. *(See Exhibits A & C: Project Location map & Weatherport example)*

Should radio communications prove difficult using the existing radio repeaters located near the United States Geological Survey (USGS) weather station at the summit of Mt. Waiʻaleʻale and on Laʻau Ridge, it might be necessary to place additional repeaters in the area. The radio repeaters would be solar powered and housed in weather protective cases, additional instrumentation may be added to repeater structure. The height of the antennae (tallest component) will be approximately 10 to 15 feet above grade and the exact foot print of the repeaters should not exceed 36 square feet. The locations will be selected for the installation of the radio repeaters, where they least impact the Native Forest and will avoid any rare or endangered plants.

C. Schedule

The project goal is to secure all necessary permits, including a conservation district use permit by the first quarter of Fiscal Year 11 (July 2010 – Sept 2010). The anticipated construction start date for this project would then be the second quarter of Fiscal Year 11 (Oct 2010 – Dec 2010) and all phases of the project will be completed within 12 months.

i. Fence Corridor Clearing

Clearing of vegetation along the fence corridor will be completed as the first action by the contractor. A 3 month time period has been allocated for this task.

ii. Fence Installation

Fence installation will immediately follow the corridor clearing. The entire process will be completed within 12 months. Fencing material will be transported to the site by helicopter and all construction will be done by hand. Due to the remote location, the construction crew will camp at the work site at intervals. The duration of their stay will be determined by the contractor hired and the weather conditions encountered. Camping will be a necessity and will occur in existing clearings. Although the construction of the fence should take less than 12 months, due to unpredictable weather conditions that exist, we have scheduled 1 year for the project in order for the contractor to take advantage of the best weather conditions. The predominant weather patterns are trade winds based upon high pressure systems north of the state. During the winter months, Kona low pressure systems can also significantly affect the weather conditions at this elevation. Wind and cloud conditions at this location create fewer opportunities for access than most other areas on the island of Kauaʻi. The work will be weather dependent and activity may not be continuous within the project time period.

iii. Weatherport Installation

The weatherport assembly will consist of a pre-fabricated weatherproof tent that is erected on a raised wooden platform. The approximate size of the shelter will be 20 ft wide by 20 ft long and 8 ft in height. Their location will be carefully selected to minimize disturbance to native plants. Areas converted to non-native grass and weeds by feral ungulates will be considered first. *(See Exhibit F: Pig Control map)*

iv. Inspections and Maintenance

The fence and weatherports will be inspected and maintained. The maintenance will be a part of the natural resource management actions carried out within the project area on a semi-annual schedule. Biologists with expertise in the field of non-native vertebrates and invertebrates, as well as biologists with expertise in conducting auditory seabird surveys, will also be allowed to monitor the area.

v. Ungulate Control

Once fence construction has been completed intensive ungulate control activities will be undertaken. Monitoring protocols will be put into place to track the decline of the resident pig population, and detect the presence or absence of ungulates throughout the valley. Pigs will be dispatched on site and placed away from the stream corridor.

vi. Weed Control

Monitoring of invasive weeds will occur along the fence line and surrounding areas during routine maintenance inspections to assess plant regeneration. Other weed control activities will occur throughout the preserve to maintain the integrity of the ecosystem. Invasive weeds such as Kāhili ginger (*Hedychium gardnerianum*), strawberry guava (*Psidium cattleianum*) and Australian tree fern (*Sphaeropteris cooperi*) will be a top priority for management in the project area. Weed removal will be carried out using approved mechanical and chemical methods shown to be highly effective in other areas and in accordance with state and federal laws

D. Funding Sources

Fundraising for this project will commence upon approval of the Conservation District Use Permit.

III. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. General

McBryde has been a dedicated steward of Wainiha for well over a century, and in 2007 entered into a 10 year conservation agreement with The Nature Conservancy creating the state's third largest nature preserve. This preserve includes one of Kauai's largest river systems and is therefore vastly important to the mission of the Kaua'i Watershed Alliance in their preservation of watershed resources.

The fence line passes through a 30–50% cover of *Metrosideros polymorpha* lowland wet forest. Riparian sections of stream bank where the fence line passes can be somewhat level to moderately steep and dominated by non-native understory trees of *Psidium guajava* and *Aleurites moluccana* and interspersed with common native tree components such as *Pisonia umbellifera, Antidesma platyphyllum* var. *hillebrandii, Ilex anomala, Psychotria mariniana,* and *Kadua affinis*. Moving further from the stream toward the valley walls, the proposed fence line rises up through very steep open slopes dominated by matting native ferns of *Dicranopteris linearis* & *Diplopterygium pinnatum* with occasional *Metrosideros* forest patches dominated by understory ferns of *Microlepia strigosa* & *Sphenomeris chinensis (Wood, 2009)*.

The fence alignment is located in the upper portion of Wainiha Valley, approximately 9.0–9.5 km from the coast where the area is wet, with an average annual rainfall of 160–200 inches. Here, the soils at and near the banks of the Wainiha Stream, are classified as Kolokolo extremely stony clay loam, which is found on stream bottoms subject to damaging flow. Away from the stream, as the elevation increases, the soils are classified as rough mountainous land, which is accurately described as "very steep land broken by numerous intermittent drainages" *(Foote, et al, 1972). (See Exhibit H: Topography map)*

Helicopters will be the primary means of access to the remote project area. There is no public access to the location. The McBryde parcel is landlocked by the Robinson parcel to the North and ground access is via permission from the Robinson Family Partners. Step over gates will allow access across the fenceline should it be needed. *(See Exhibit A: Project Location and Exhibit B: Fence Examples)* The closest paved government road is Wainiha Powerhouse Road, which ends at the McBryde Hydroelectric power generation plant, which is over 2 miles downstream from the project area. Neither public, Na Ala Hele nor any other official trails are located near the project site. *(See Exhibit E: Vicinity & Parcel map)*

B. Flora and Fauna

The fence line passes through a 30–50% cover of *Metrosideros polymorpha* lowland wet forest. Riparian sections of stream bank where the fence line passes can be somewhat level to moderately steep and dominated by non-native understory trees of *Psidium guajava* and *Aleurites moluccana* and interspersed with common native tree components

such as *Pisonia umbellifera, Antidesma platyphyllum* var. *hillebrandii, Ilex anomala, Psychotria mariniana,* and *Kadua affinis*. Moving further from the stream toward the valley walls, the proposed fence line rises up through very steep open slopes dominated by matting native ferns of *Dicranopteris linearis* & *Diplopterygium pinnatum* with occasional *Metrosideros* forest patches dominated by understory ferns of *Microlepia strigosa* & *Sphenomeris chinensis (Wood, 2009)*. While native fauna are present in the project area, surveys have indicated that the scope and scale of fence construction activities will have no detrimental impact on their populations.

Forest bird species noted in the project area include Kaua‘i ‘Amakihi (*Hemignathus kauaiensis*), ‘Apapane (*Himatione sanguinea*), and ‘Elepaio (*Chasiempis sandwichensis*). No nest sites were detected during surveys of the fenceline. Ground nesting sea birds including the White-tailed Tropicbird (*Phaethon lepturus*), the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened Newell Shearwater (*Puffinus newelli*) also nest in Wainiha, however no nests sites were detected along the fenceline during the 2009 nesting season. The location and topography of the proposed fenceline insures that Native Hawaiian fish, insect, mollusk, and waterfowl species living in the Wainiha stream corridor will not be impacted by the fence construction. The fence will not continue across the stream but create barriers on either side of the gorge, effectively halting pig traffic through the area but not altering the stream in any way. *(See Exhibit B: Fence Examples)*

C. Cultural Resources

The following steps have been taken to determine the cultural and historical significance of the project area:

i. Cultural Impact Assessment

A cultural impact assessment has been completed for the project in October 2009, by Samuel M. Gon III, Ph.D., the Senior Scientist and Cultural Advisor with The Nature Conservancy Hawai‘i. A copy of his survey is included as part of the supporting documents for the Environmental Assessment. The Executive Summary is as follows:

> “A review of pertinent literature and records, extracts from recently conducted interviews with regional cultural practitioners and elders, and previous investigations by the State Historic Preservation Division (SHPD), and contracted archeologists on sites, features and practices of cultural significance at the proposed fence route in the Wainiha Preserve, Wainiha Ahupua‘a, Hanalei District, Island of Kaua‘i, reveals that there are no archeological sites within the proposed area, and that only lands several kilometers *ma kai* (seaward) of the site include significant sites. This corroborates the described geography of historical activities

> in the region, concentrated in arable valley bottoms and lower elevations near the coast, and minimal above Lā‘au Ridge. The lands of the proposed fence area bear significance as the *wao nahele* (forested zone) containing native plants and animals of great cultural value, and as *wahi pana* (storied places) tied to the *Mū-‘ai-mai‘a* (the banana-eating Mū people) and the *menehune*. Persistence of *mai‘a* (banana) growing in the remotest parts of upper Wainiha is traditionally pointed to as evidence of past habitation of the *Mū*. Otherwise, the upper valley retains very strong native vegetation, but with the start of significant invasion by alien plants and animals. The proposed conservation actions (fencing and ungulate control), designed to protect the native forest and the native species that reside within it, will enhance the cultural value of the lands and will exercise care to retain traditional access, such as to gather native plant material for hula and other Hawaiian arts."

ii. Archaeological Assessment

An archaeological assessment has been competed for the project in October 2009 by T.S. Dye & Colleagues, Archeologists, Inc. A copy of this survey is included in the supporting documents with the following summation of their findings:

> "This document presents the results of an archaeological survey of proposed fence lines and other facilities associated with an animal control fencing project in upper Wainiha Valley. No historic sites were found in the proposed fence area and no historic properties will be affected by the animal control fence project."

Note: Should any iwi or Native Hawaiian cultural or traditional deposits be found during fence construction, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

D. Sensitive Habitat

Many *threatened*, *endangered* and even *critically endangered* plant and animal species have been documented either within the proposed fence area or in close proximity. The forests and cliffs in and around this area support a diverse assemblage of native forest birds, waterfowl, ground-nesting seabirds and insects. Some of these animals are federally listed as endangered species or candidates for listing as endangered species.

Over 2,400 acres of the Wainiha preserve have been classified as critical habitat for *Cyrtandra cyanoides*. Of those acres, 416 have recently been listed as critical

habitat habitat in the montane wet ecosystem type and 756 acres are designated in the lowland wet category. The montane wet is occupied by 15 endangered plant species, 2 endangered forest bird species and the endangered picture winged fly. The critical habitat designation implies that endangered species are found in the project area and that the area provides suitable habitat which is essential for species recovery. The valley also contains existing populations and suitable habitat for several other endangered species (*See Exhibit D: Critical & Rare Resources maps*)

Table- 2 Critical Habitat within the Wainiha Valley Protective Fence Project Area

Scientific Name	Common Name
Astelia waialealae	painiu
Melicope puberula	alani
Chamaesyce remyi var remyi	akoko, koko
Stenogyne kealiae	
Dryopteris crinalis var bodosorus	palapalai aumakua
Chamaesyce remyi var kauaiensis	`Akoko, Koko, Kokomalei
Cyrtandra oenobarba	ha`iwale, kanawao, ke`oke`o
Dubautia waialealae	naenae
Geranium kauaiense	nohoanu, hinahina
Keysseria erici	
Keysseria helenae	
Labordia pumila	kamakahala
Lysimachia daphnoides	lehua makanoe
Melicope degeneri	alani
Myrsine mezii	kolea
Phyllostegia renovans	
Platydesma rostrata	pilo kea lau lii
Loxops caeruleirostris	‘Akeke‘e
Oremystis bairdi	‘Akikiki
Drosophila attigua	Hawaiian picture-wing fly

Source: U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Final Designation or Non-designation of Critical Habitat for 95 Plant Species from the Islands of Kaua‘i and Niihau, HI.

Table- 3 Additional Species Found In Project Area

Scientific Name	Common Name
Phyllostegia helleri	
Cyrtandra limahuliensis	Ha`iwale, Kanawao, Ke`oke`o
Adenophorus periens	
Lentipes concolor	`O`opu Alamo`o
Awaous guamensis	`O`opu Nakea
Sicyopterus stimpsoni	`O`opu Nopili
Anas wyvilliana	*Hawaiian Duck, Koloa*
Pterodroma sandwichensis	Hawaiian Dark-Rumped Petrel, `Ua`u
Puffinus newelli	Newell’s Shearwater
Hemignathus kauaiensis	Kaua‘i Amakihi
Chasiempis sandwichensis sclateri	Kaua‘i Elepaio

Himatione sangueinea	Apapane
Phaethon lepturus	Koae kea (White-tailed Tropicbird)
Atyoida bisulcata	`Opaekala`ole

E. Other Uses

Natural water collection and storage is the most important resource attribute within the project area. This area provides water for a hydroelectric power plant in Wainiha valley, owned by McBryde Sugar Company, Limited. The river also provides water for small independent diversified agriculture, including Kalo production in the lowest portion of the valley.

IV. SUMMARY OF MAJOR IMPACTS

A. Major Positive Impacts

The most positive impact of this project will be the long term protection of forested watershed and native Hawaiian bio-diversity in approximately 7,050 ac of the Wainiha. Natural water collection is an essential function and can be considered the most important resource of this ecosystem. The native forests in this region not only collect moisture from moisture laden clouds, but also receive water from the eastern Alaka‘i.

The proposed fence will protect the existing native lowland wet forest, therefore maintaining the ability of Wainiha to collect and retain rainfall as well as provide consistent, perennial stream flow to the lower valley. The exclusion of feral pigs from the remote upper valley will allow native vegetation to regenerate in degraded areas. The protective fence will stop the continued damage being caused by feral pigs such as: spreading of invasive species i.e. strawberry guava and aggressive grasses, harm to Hawaiian forests and streams by impairing the function of watersheds**,** contamination of the fresh water supply with disease-causing organisms, destruction of native species and their habitat**,** prevention of the recovery of rare and endangered species**,** increased rock falls, mudslides, and reef siltation by accelerated erosion. This will preserve the project area’s ability to soak up rainfall and mitigate the effects of flood and drought cycles while providing clean, consistent stream flow. Preservation of the structure and function of the Wainiha river watershed is required in order to maintain biodiversity within the river ecosystem, ensure adequate water supply for human uses downstream, and ultimately protect coastal reefs and marine resources from siltation.

Protecting, sustaining, and even improving water production is critical to Kaua‘i’s future. Abundant clean water is needed for a growing population, the agricultural and commercial activities that support it and hydro-electric power plants which are important in providing alternative energy sources.

This project will protect and allow for the recovery of natural communities and their constituent native species within the Wainiha preserve. The biological diversity and cultural integrity of this area, as it exists today, will be preserved. Contained within the

project area are several vegetative classifications including Native Wet Cliff Vegetation, Closed ‘Ōhi‘a Forest, Native Wet Forest and Shrubland, and Open ‘Ōhi‘a Forest *(Hawai‘i GAP Landcover Analysis, 2000).* Critical Habitat for 1 endangered plant species also exists within the project area *(Critical Habitat, 2004)* and two other endangered species have been documented within the project area (See Table-2). Of the 222 native plant species naturally occurring within the Wainiha Preserve region, 177 are endemic and 45 are considered indigenous. The Wainiha Preserve is prime habitat for 63 Kaua‘i single island endemic (SIE) taxa which is 28% of the entire 225 SIE taxa unique to Kaua`i. *(Wood, 2009).* Common forest bird species include Kaua‘i ‘Amakihi (*Hemignathus kauaiensis*), ‘Apapane (*Himatione sanguinea*), and ‘Elepaio (*Chasiempis sandwichensis*). Ground nesting sea birds including the White-tailed Tropicbird (*Phaethon lepturus*), the endangered Hawaiian Petrel *(Pterodroma sandwichensis),* and the threatened Newell Shearwater *(Puffinus newelli)* also nest in Wainiha. The Wainiha River itself is home to a number of native Hawaiian species of fish, insects, mollusks and waterfowl, including the endangered Koloa duck *(Anas wyvilliana).*

B. Major Negative Impacts

No specific major negative impacts have been identified. Discussed below are potential impacts of limited scope to the project area.

There will be some short-term negative impact on the environment associated with the fence construction. Disturbance of vegetation and soil will occur in the immediate vicinity of the planned fence line because the work entails clearing the corridor of vegetation. Plants will be pruned to several inches above ground along the entire corridor up to a width of 10 ft. This will involve the removal of common native plants, but no rare or sensitive species (the fence alignment will avoid rare plant occurrences). The weatherport foot prints are very small; they will be carefully sited and will not have a lasting impact. There will be some trampling of the vegetation during installation.

There will be a temporarily increased potential for accidental introduction of non-native plants along the fence corridor due to the possibility of seed transport on shoes, clothes, packs, and/or fencing material and equipment from off site. Disturbance of the ground surface along the fence line will also lead to conditions which might favor colonizing weed species that already exist within the project area. It should be noted that the impacts observed from the existing fences for over 10 years has been negligible. Any incidental weed introductions along the fence corridor will be controlled during routine fence maintenance which will be done on a semi-annual basis.

The biological surveys found no nesting colonies for ground nesting sea birds along either section of the proposed protective fence alignment. Although no known flight ways intersect the fence alignment and the fence profile is only 48 inches in height, there is still a possibility that the fence may in some way impact the sea birds and the Hawaiian hoary bat. There will be no barbed wire used. The top of the fence will be <u>woven with electric polytape</u> to prevent birds from flying into it. *(See supporting documents for Biological Survey)*

Although the project area is very remote, located completely on private land with no access, there are culturally significant native flora and fauna. The construction of the fence will not significantly influence access to the area for cultural purposes and a step over access will be provided along the fence line. *(See Exhibit F: Pig Control map)*

V. PROPOSED MITIGATION MEASURES

A. Vegetation and Soil Disturbance

The fence and placement of weatherports have been aligned and located to reduce the amount of native vegetation to be cut and to avoid harm to rare or endangered species. The weatherports have small footprints, therefore keeping ground disturbance to a minimum. There were no rare plant taxa observed on this proposed fence line *(Wood, 2009)*. Upon removal of the weatherports, the area will be left to regenerate with naturally occurring native plants. These areas will be monitored every six months and non-native species will be removed using approved mechanical and chemical methods shown to be highly effective in other areas.

Soil disturbance may be unavoidable, particularly during vegetation clearing, although clearing will not occur down to the soil level. Clearing at no wider than 10 ft would have an impact of no more than one half an acre of the total 3,700 acres of the project area. After clearing, the fence material will be dropped by helicopter at intervals along the corridor, and the fence mesh unrolled to lay flat on the ground. Workers will walk on the mesh as they install the fence, and then walk on the outside apron portion of the fence after it is erected. This will greatly reduce soil disturbance caused by the activity of fence construction. Once the fence is completed and erosion potential assessed, water bars will be installed in areas with steep slopes subject to erosion. These bars will divert water from flowing directly down the fence line thus reducing erosion. Erosion due to the installation of the fence line will be monitored and if present, addressed during routine maintenance checks on a semi-annual basis.

B. Weed Introductions

There will be a temporarily increased potential for accidental introduction of non-native plants along the fence corridor due to the possibility of seed transport on shoes, clothes, packs, and/or fencing material and equipment from off site.

Throughout the project and subsequent access, strict protocols will be used to:
1) Inspect all field gear and equipment before going into the field. Clean and inspect all gear and supplies, pressure washing as needed, (fencing material, weatherports, camp materials, and personnel gear) to prevent the introduction of alien species (seeds, plants, and insects). Especially be aware of weed seeds and insects (and their eggs). Clods of dirt or mud can mask these hitchhikers. All field items should be inspected, e.g., footwear, socks, pants, jackets, raingear, food-stuffs, tools, packs, tents, and other containers. If materials have been in storage, be aware that arthropods can lay eggs within equipment. After usage tools, field gear and equipment should be checked and wiped down; weed seeds can easily become lodged in the corners and hinges, or stuck in

oil or other fluids. Cleaning of gear can be performed by use of a hose, brush, rags, or knife edge, and should be done in a designated area..Fumigation protocols will not be needed as wood posts will not be used in the fence construction. All protocol information will be included in contracts with any contractors. Invasive weeds will be discussed with the contractor or anyone else who visits the site so that they become familiar with what to be aware of during construction.

2) Monitor the fence and remove any weeds that become established or spread as a result of the disturbance during construction or maintenance of fence line. A schedule to monitor the fence and control incidental weed introduction will occur at regular intervals after construction and will be included in the management plan on a semi-annual basis. Funding will be allocated for this action.

3) Pack out all construction materials, trash and foodstuffs. At the completion of construction and installation, all rubbish and waste will be removed from work sites. It is important to be aware of the possibility of spreading unseen insects, bacteria, blights, and other plant pathogens. Organic trash (orange and banana skins, apple or pear cores, peach and avocado pits, etc.) should be treated as other garbage and packed out. Keeping in mind that in certain environments, your meal (in your food or digestive tract) can grow and certain seeds have strong potential to naturalize, i.e. guava, cherry tomatoes, chili peppers, berries, etc. therefore, human waste will be disposed of as outlined earlier in this document.

C. Ground Nesting Seabirds and Bats

The biological surveys found no nesting colonies for ground nesting sea birds along either side of the proposed protective fence alignment. Although no known flight ways intersect the fence alignment and the fence profile is only 48 inches in height there is still a possibility that the fence may in some way impact the sea birds and the Hawaiian hoary bat. There will be no barbed wire on any portion of the fence and the top of the fence will be woven with electric poly tape, thereby reducing any possible impalement by both seabirds and bats, on the fence.

As recommended by Menard (2001), we are timing the fence clearing (i.e. removal of woody vegetation) to occur when bats are not likely to be present in the project area to minimize the risk of disturbing or killing roosting bats. Menard's thesis discusses the reasons why roosting bats would derive advantages from roosting in the warm lowlands during the April to August period and no woody plants, suitable for bat roosing, will be removed or trimmed during this period of potential bat birthing and pup rearing season.

Should any seabirds or Hawaiian hoary bats be found at anytime during natural resource management of the area either the Division of Forestry and Wildlife Kaua'i Branch, Biologist or Kauai Seabird HCP Office and the U.S. Fish and Wildlife Service, will be notified and consulted. Whenever possible the following actions will also take place: circumstances described in detail; sites and carcasses photographed and GPS coordinates taken; carcasses collected, labeled (date, location, species, circumstances, collector, any

other pertinent information) and refrigerated until they can be transferred to USFWS personnel.

D. Streams

The proposed fence alignment will not cross any streams. The fence will tie into a steep, cliff section on both sides of Wainiha River. Mitigation measures inherent to stream crossing fence design are not applicable. *(See Exhibit B: Fence Examples*

E. Cultural Access

The project area is very remote and construction of the fence will not impact access to the area for cultural purposes. The fenced area belongs to a private land owner, and is regulated by their right of entry protocols. Contractors will be made aware of historical and cultural relevance of the area which will be specified in any contracts related to the project. Step overs will be included in the fence construction. *(See Exhibit B: Fence Examples)*

VI. ALTERNATIVES CONSIDERED

A. Alternative: No Action

This action effectively accepts the continued degradation of the Wainiha Preserve from existing threats of invasive weeds and feral pigs. This alternative is neither consistent with the landowners' aim nor the objectives of the Kaua'i Watershed Alliance members. No action is inconsistent with the sense of responsible stewardship for Kauai's natural resources. Conservation District Protective subzone designation, as outlined in HAR §13-5-11 states, "The objective of this subzone is to protect valuable resources in designated areas", therefore, the East Alaka'i Protective Fence Project provides a means to carry out this directive. As intended in the purpose statement for the Alaka'i Wilderness Preserve, HAR §13-3-1, "For the purposes of preserving, protecting, and conserving all manner of flora and fauna", the no action alternative will result in far greater and more damaging (potentially irreversible) environmental impacts in this area. Therefore, this alternative of no action has not been selected.

VII. ANTICIPATED DETERMINATION

The Department of Land and natural Resources issued an anticipated Finding of No Significant Impact on February 8, 2010 (See Exhibit L).

VIII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION

The environmental impacts of the Wainiha Valley Protective Fence Project have been evaluated in relation to the thirteen significance criteria listed in the Guidebook for the State Environmental Review Process. The criteria and the effects this project will have are listed:

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

   The purpose of this project is to protect the Wainiha Preserve from damage by feral pigs and invasive plants. This project will enhance the protection of the project area with minimal loss of common plants along the fence lines and initiate more intensive monitoring of resources.

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

   The upper Wainiha Valley contains intact lowland wet forests, a diverse collection of endemic plants, and important habitat for ground nesting seabirds such as the Newell Shearwater and Hawaiian Petrel. The area functions as an important watershed catchment and storage area for the entire Wainiha watershed. This project will strengthen rather than curtail these functions. Possible educational, cultural, and scientific uses will be enhanced by the completion of the project.

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

   This project is consistent with Chapter 344 in that the aim is to preserve the natural resources "by safeguarding the State's unique natural environmental characteristics". Therefore, the protection of native lowland wet forest as well as watershed will, in effect, reduce the destruction of nonrenewable resources and is in line with the state's long–term environmental policies.

4. **Substantially affects the economic, social welfare, and cultural practices of the community or state.**

   The project will not impact either the economic or social welfare, or the cultural practices of the community or state due to the remoteness and rugged terrain of the project area. There will be step overs along the fence line for access.

5. **Substantially affects public health.**

   The project will not affect public health. Potential positive impacts to public health are: improved water quality, more consistent water quantity, reduced potential for destructive flooding during heavy rain events and reduced harmful bacteria levels.

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

   The remoteness and rugged terrain of the project area in addition to the fact that the project is being done on private land, rules out any impact on population or public facilities.

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

   The purpose of this project is to improve the quality of a unique Hawaiian ecosystem over time and protect its inherent watershed function. This project requires the clearing of common native plants from along the fence alignment, and some short-term soil disturbance over an area of less than half an acre. However, this activity is necessary to protect the integrity of the ecosystem (approximately 7,050 acres), resulting in a net long-term benefit.

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

   The project supports ongoing and future management to benefit the project area but does not involve a commitment for larger actions. The protective fence project has a very small physical foot print of approximately one-half acre relative to the larger area of approximately 7,050 ac it is designed to protect. It will protect the watershed from degradation by invasive feral pigs which numerous scientific studies have demonstrated to be destructive to native forests and watersheds. The exclusion of feral pigs from the project area will allow native vegetation to regenerate in degraded areas. This project, over time, may prevent a greater need for more expansive restorative actions in the future.

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

   The project will have a beneficial effect on the rare, threatened and endangered species and the ecosystem that exist within the project area. A survey of the fence alignment by Ken Wood (biologist for the National Tropical Botanical Gardens) has determined the project will not adversely impact any rare, threatened or endangered species along the proposed fence. It is consistent with the State of Hawai‘i’s Comprehensive Wildlife Conservation Strategy (CWCS). The intent of a CWCS is to create a dynamic vision for the future of wildlife conservation. This project will also benefit 10 species that are either currently listed, or are candidates for listing, as threatened or endangered by enclosing their habitat within the management area and addressing their primary threats.

10. **Detrimentally affect air or water quality or ambient noise levels.**

    Air or water quality will not be affected. Helicopters will transport construction materials to the project site. These flights will occur during normal work hours, in areas that already have sightseeing helicopter activity, and will not fly over residences. Thus, noise levels will be slightly elevated during the installation flights, but this impact will be minor and will occur only for a short time. The distance to the nearest residence is approximately 6 to 8 miles.

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

The project will not negatively affect an environmentally sensitive area nor suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, or geologically hazardous land. This project is located in the Wainiha Preserve, in an environmentally sensitive area that includes freshwater streams, native lowland wet forest; however, the intent of the project is environmental protection of this habitat. The foot print of the protective fence is very minimal, at less than one-half acre. The fence will not continue across the stream but create barriers on either side of the gorge, effectively halting pig traffic through the area but not altering the stream in any way. The best management practices are in place to prevent and minimize any anticipated short-term impacts, and are not anticipated to result in long-term damage to any of the habitat.

12. Substantially affect scenic vistas and view planes in county or state plans or studies.

The project will not have any substantial effect on any scenic vistas or view planes. The project area is located in a remote portion of the Wainiha Preserve, the geography of which would only allow the proposed fence to be visible from the air.

13. Requires substantial energy consumption.

Energy consumption for this project will be of a short duration and not substantial. Direct energy requirements/consumption will be restricted to the fuel required for helicopter flights and fence construction.

IX. PERMITS REQUIRED

The project falls in a Conservation District Protective Subzone. Therefore the project requires a board permit from the Board of Land and Natural Resources, Department of Land and Natural Resources (Section 13-Conservation District).

X. EA PREPARATION

This draft Environmental Assessment is being prepared in consultation with the land owner, McBryde Sugar Company, Limited. This document, and all supporting documents are available on the Hawai‘i Association of Watershed Partnerships at www.hawp.org.

The EA prepared primarily by:

The Nature Conservancy (TNC)
Kaua‘i Program
Līhu‘e Town Plaza
4180 Rice Street, Suite 102B
Līhu‘e, HI 96766

The Archeological Survey prepared by:

Kekapala P. Dye and Thomas S. Dye, Ph.D
T.S. Dye & Colleagues, Archeologists, Inc.
735 Bishop Street, Suite 315
Honolulu, Hawaii 96813

The Cultural Survey prepared by:

Sam M. Gon III, Ph.D
Senior Scientist and Cultural Advisor
The Nature Conservancy of Hawai‘i
923 Nu‘uanu Avenue
Honolulu, HI 96817

The Biological Surveys prepared by:

Ken Wood
National Tropical Botanical Garden
3530 Papalina Rd.
Kalaheo, HI 96741

Nick Holmes, PhD
Coordinator
Kaua‘i Endangered Seabird Recovery Project
PO Box 458
4622 Waimea Canyon Drive
Waimea, HI 96796

XI. REFERENCES CITED

Aplet, G. H., Anderson, Stephen J., Stone, Charles P., 1991. Association between feral pig disturbance and the composition of some alien plant assemblages in Hawaii Volcanoes national Park. *Vegetation 95: 55-62*.

Baker, J. K., 1979. The feral pig in Hawaii Volcanoes National Park, *Proceedings: First Conference on Scientific research in the National Parks*, pp. 365-367.

Cooray, R. G. and Mueller-Dombois, D., 1981. *Island Ecosystems: Biological Organization in Selected Hawaiian Communities*, Hutchinson Ross Publishing Co., Stroudsburg, PA, pp. 309-317.

Foote, D. E., Hill, E. L., Nakamura, S. and Stephens, F., 1972. *Soil Survey of the Islands of Kaua'i, Oahu, Maui, Moloka'i, and Lana'i, State of Hawai'i,* USDA, SCS and the University of Hawai'i A.E.S. U.S. Government Printing Office, Washington, D.C., http://www.ctahr.hawaii.edu/soilsurvey/5is/Htm/howmade.htm .

Giffin, Jon, 1978. Ecology of the feral pig on the island of Hawaii. *Elepaio* 37 (12): 140-142.

Higashino, Paul K., and Stone, Charles P., 1982. The fern jungle exclosure in Hawaii Volcanoes National Park: 13 years without feral pigs in a rain forest. *Proceedings: Fourth Conference in Natural Sciences. Hawaii Volcanoes National Prk, p. 86.* Cooperative National Park Resources Studies Unit, University of Hawaii at Manoa.

Jacobi, James D., 1976. The influence of feral pigs on a native alpine grassland in Haleakala National Park. *Proceedings: Hawaii Volcanoes National Park Natural Resources Conference* 1: 107 – 112.

Katahira, L., 1980. The effects of feral pigs on montane rain forest in Hawaii Volcanoes National Park. Proceedings, 2nd Conference in Natural Sciences, Hawaii Volcanoes National Park, Cooperative National Park Resources Studies Unit, University of Hawaii, Manoa, Honolulu, HI, pp. 173-178.

McEldowney, G.A., 1930. Forestry of Oahu. *Hawaiian Planters' Record*, 34 (3): 267-287.

Menard, Theresa C., 2001. *Activity Patterns of the Hawaiian Hoary Bat* (Lasiurus cinereus semotus) *in Relation to Reproductive Time Periods*. Master's Thesis. University of Hawaii, Manoa. Honolulu, HI. 153 pp.

Mitchell, C, Ogura, C, Meadows, D. W., Kane, A., Strommer, L., Fretz, S., Leonard, D. and McClung, A., 2005. *Hawai'i's Comprehensive Wildlife Conservation Strategy*. *Department of Land and Natural Resources*, http://www.state.hi.us/dlnr/dofaw/cwcs/process_strategy.htm (September 26, 2005).

Molokai Hunting Test Working Group, 1998. Findings and Recommendations in Response to S.R. # 68/S.C.R. # 83 of the Seventeenth State Legislature, State of Hawaii, 1993. December 1998.

NESH Working Group. 2005. Draft Newell's shearwater Five-year workplan. Report on recovery objectives, http://www.kauai-seabirdhcp.info/background/recovery.html .

NOAA Coastal Services Center, 2000. Hawai'i Gap Analysis Program, http://www.csc.noaa.gov/crs/lca/hawaii.html .

The Nature Conservancy 2005. Kaua'i Watershed Management Plan: Overall Management Strategy. Prepared by the Kaua'i Watershed Alliance, http://www.kauaiwatershed.org/KWA_management_plan.pdf (April 2005).

U.S. Fish and Wildlife Service, 2004. Critical Habitat Designation. Endangered and Threatened Wildlife and Plants; Final Designation or Non-Designation of Critical Habitat for 95 Plant Species from the Islands of Kaua'i and Ni'ihau, HI USFS Pacific Islands Office.

U.S. Fish and Wildlife Service, 2005. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region, Portland, Oregon.

U.S. Fish and Wildlife Service, 2010. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for 48 Species on Kaua'I and Designation of Critical Habitat; Final Rule. Federal Register/ Vol. 75, No. 70/ Tuesday, April 13, 2010/ Rules and Regulations.

Department of Forestry and Wildlife, 2007, DOFAW's management guidelines to Vegetation Classifications, *DOFAW Management Guidelines. Department of Land and Natural Resources, Division of Forestry and Wildlife Hawaii,* http://www.state.hi.us/dlnr/dofaw/guidelines/mg_jw03/page2.html (November 27, 2007).

Warner, Richard E., 1956 – 1969. *Ecological investigation on the Hawaiian pig* (1959); *Ecology of the Wild Pig* (1963, 1963); and *Feral Game Mammal Survey* (1969). State of Hawaii, Divisionof Fish and Game, Project # W-r-R10: Project # W-5-R13; Project # W-5-R14; and Project # W-5-R-20.

Wood, K. R., 2006a. Summary Report of Research, Limahuli Valley, Kaua'i, Hawai'i. Biological report prepared for National Tropical Botanical Garden managing staff. 76pp.
Wood, K. R., 2007. *Notes on the Flora of Wainiha and Alaka´i, Kaua´i, Hawai´i*, National Tropical Botanical Garden, Kalaheo, HI, p 8, pp. 29-57. http://hawp.org/file-list.php?SubSite=03 .

Wood, K. R., 2009. *Further Notes on the Flora of Wainiha, Kaua'i, Hawai'i with comments on Proposed Strategic Fence*. National Tropical Botanical Garden, Kalaheo, Kaua'i, HI.

Exhibits

Exhibit A ……Project Location Map

Exhibit B ……Fence Construction Examples

Exhibit C ……Weatherport Example

Exhibit D ……Critical & Rare Resources Map

Exhibit E ……Vicinity & Parcel Map

Exhibit F ……Pig Control Map

Exhibit G ……Silo Trap & Feeder Diagrams

Exhibit H ……Topography Map

Exhibit I ……..Pre-Assessment Consulted Agencies & Parties

Exhibit J ……..Pre-Assessment Comment Letters

Exhibit K …….Draft EA Consulted Agencies & Parties

Exhibit L ……..DLNR – FONSI Determination Letter

Exhibit M …….Draft EA Comment Letters & Responses

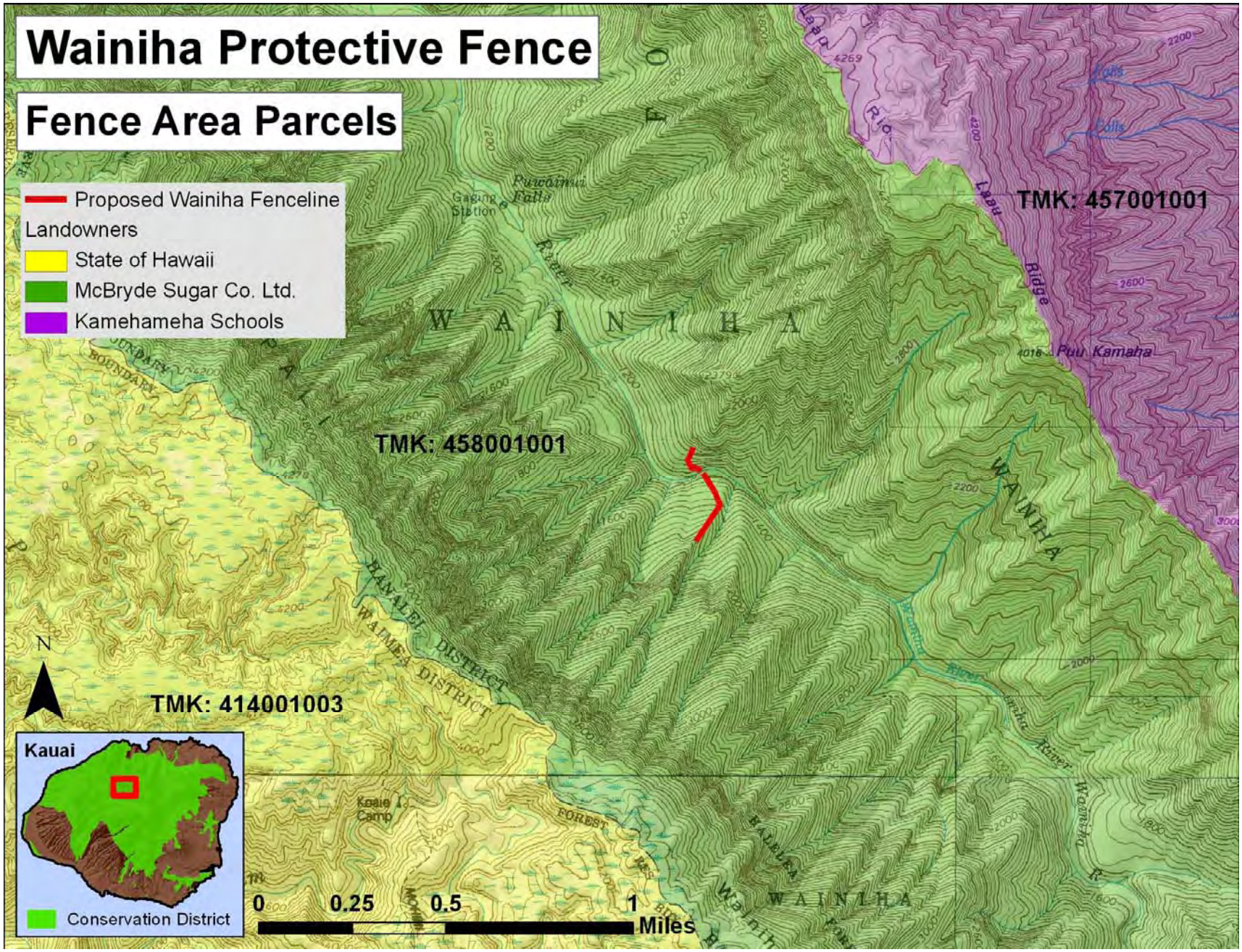

Wainiha Protective Fence
Fence Area Parcels
Proposed Wainiha Fenceline
Landowners
State of Hawaii
McBryde Sugar Co. Ltd.
Kamehameha Schools
TMK: 457001001
TMK: 458001001
TMK: 414001003
Puu Kamaha
Puwainui Falls
Gaging Station
Kaale Camp
HANALEI DISTRICT
WAIMEA DISTRICT
FOREST
WAINIHA
N
Kauai
Conservation District
0
0.25
0.5
1
Miles

Exhibit A

Exhibit A

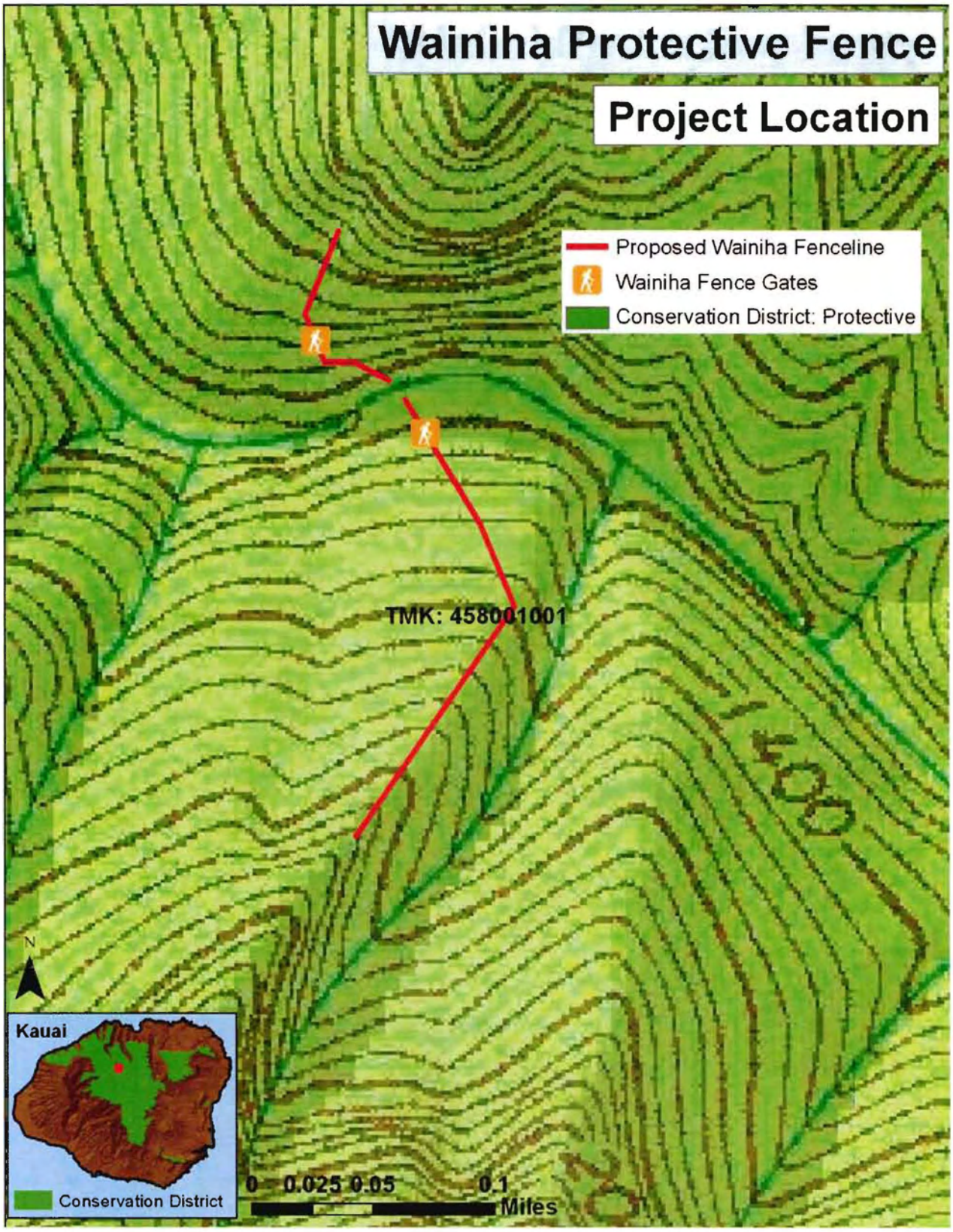
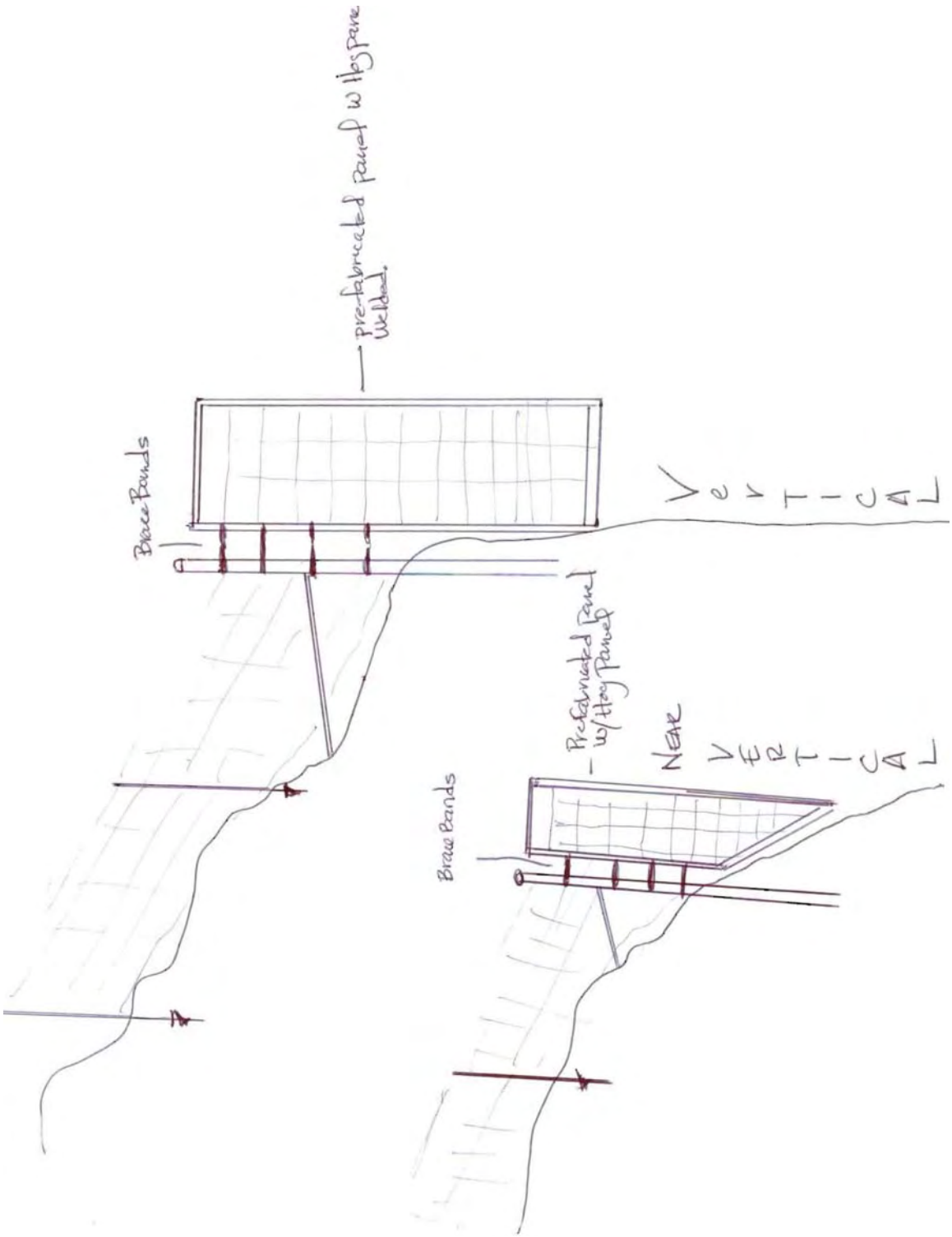

Wainiha Protective Fence
Project Location
Proposed Wainiha Fenceline
Wainiha Fence Gates
Conservation District: Protective
TMK: 458001001
N
Kauai
Conservation District
0 0.025 0.05 0.1
Miles

Exhibit B

Fence Example

Step over gate example at Kanaele bog.

Exhibit B

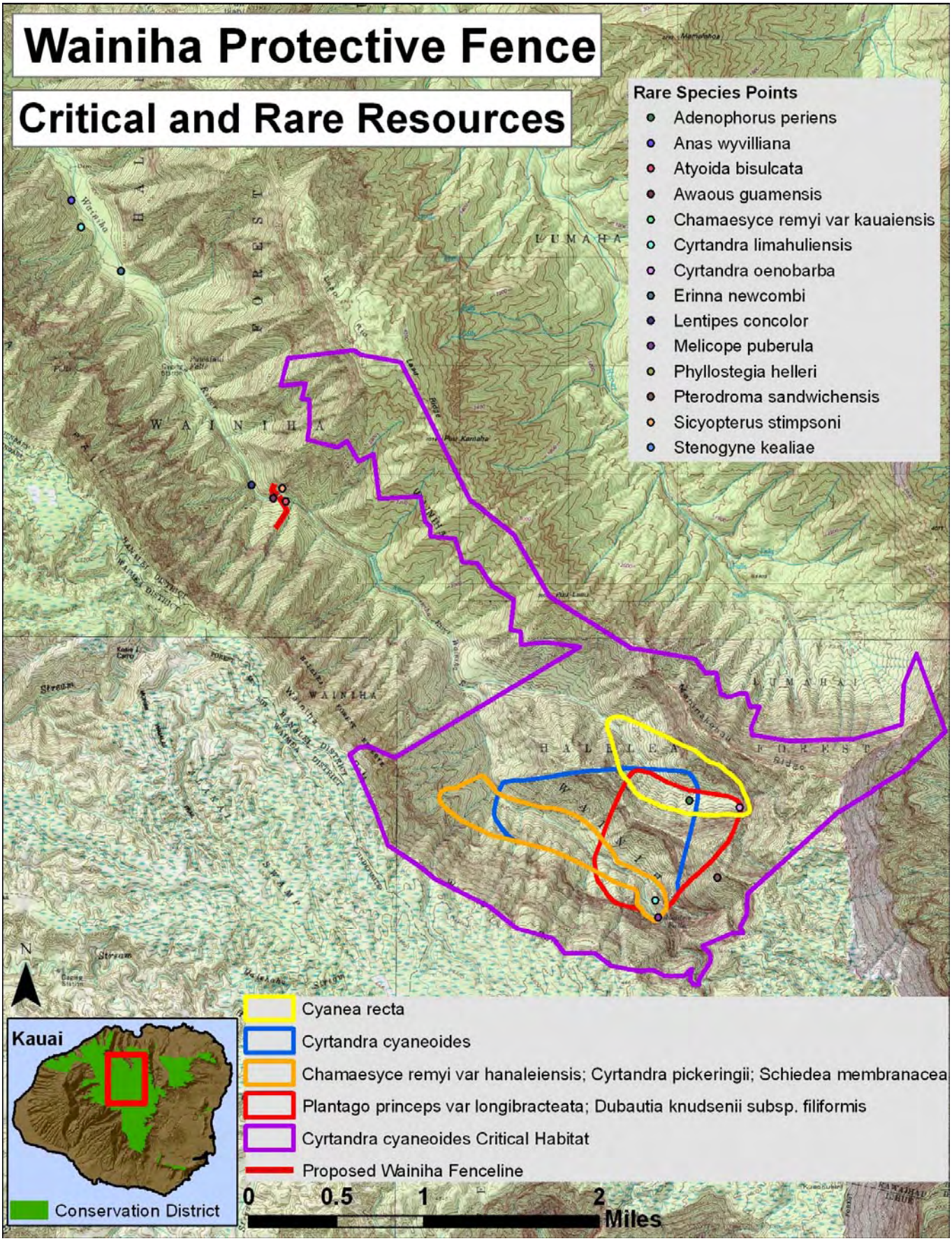


Example of cliff tie in to rock, above the stream.

Exhibit C

Weatherport Example

Exhibit D


Wainiha Protective Fence
Critical and Rare Resources
Rare Species Points
Adenophorus periens
Anas wyvilliana
Atyoida bisulcata
Awaous guamensis
Chamaesyce remyi var kauaiensis
Cyrtandra limahuliensis
Cyrtandra oenobarba
Erinna newcombi
Lentipes concolor
Melicope puberula
Phyllostegia helleri
Pterodroma sandwichensis
Sicyopterus stimpsoni
Stenogyne kealiae
Cyanea recta
Cyrtandra cyaneoides
Chamaesyce remyi var hanaleiensis; Cyrtandra pickeringii; Schiedea membranacea
Plantago princeps var longibracteata; Dubautia knudsenii subsp. filiformis
Cyrtandra cyaneoides Critical Habitat
Proposed Wainiha Fenceline
Kauai
Conservation District
N
0
0.5
1
2
Miles

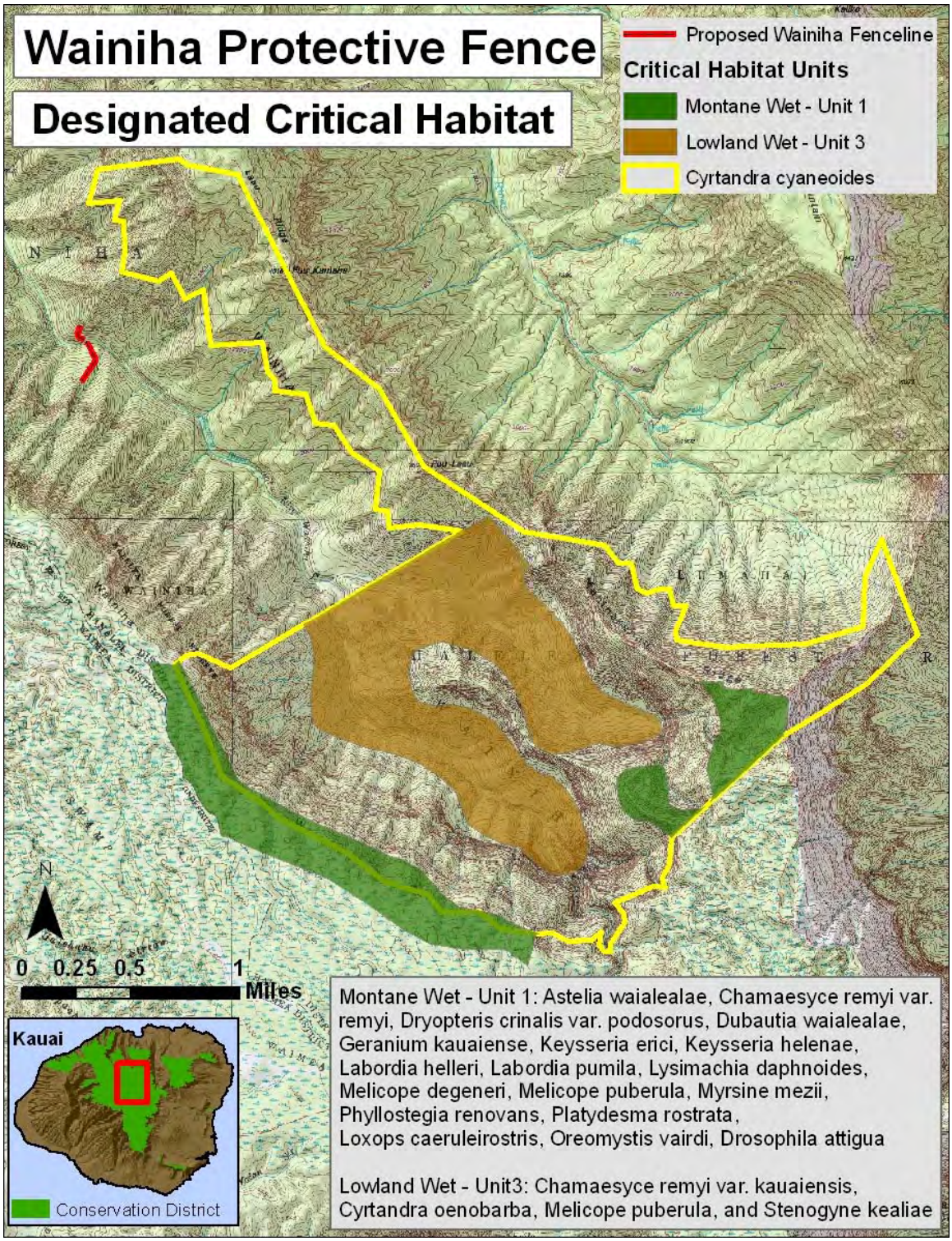

Wainiha Protective Fence
Designated Critical Habitat
Proposed Wainiha Fenceline
Critical Habitat Units
Montane Wet - Unit 1
Lowland Wet - Unit 3
Cyrtandra cyaneoides
N
0 0.25 0.5 1
Miles
Kauai
Conservation District
Montane Wet - Unit 1: Astelia waialealae, Chamaesyce remyi var. remyi, Dryopteris crinalis var. podosorus, Dubautia waialealae, Geranium kauaiense, Keysseria erici, Keysseria helenae, Labordia helleri, Labordia pumila, Lysimachia daphnoides, Melicope degeneri, Melicope puberula, Myrsine mezii, Phyllostegia renovans, Platydesma rostrata, Loxops caeruleirostris, Oreomystis vairdi, Drosophila attigua
Lowland Wet - Unit3: Chamaesyce remyi var. kauaiensis, Cyrtandra oenobarba, Melicope puberula, and Stenogyne kealiae

Exhibit E

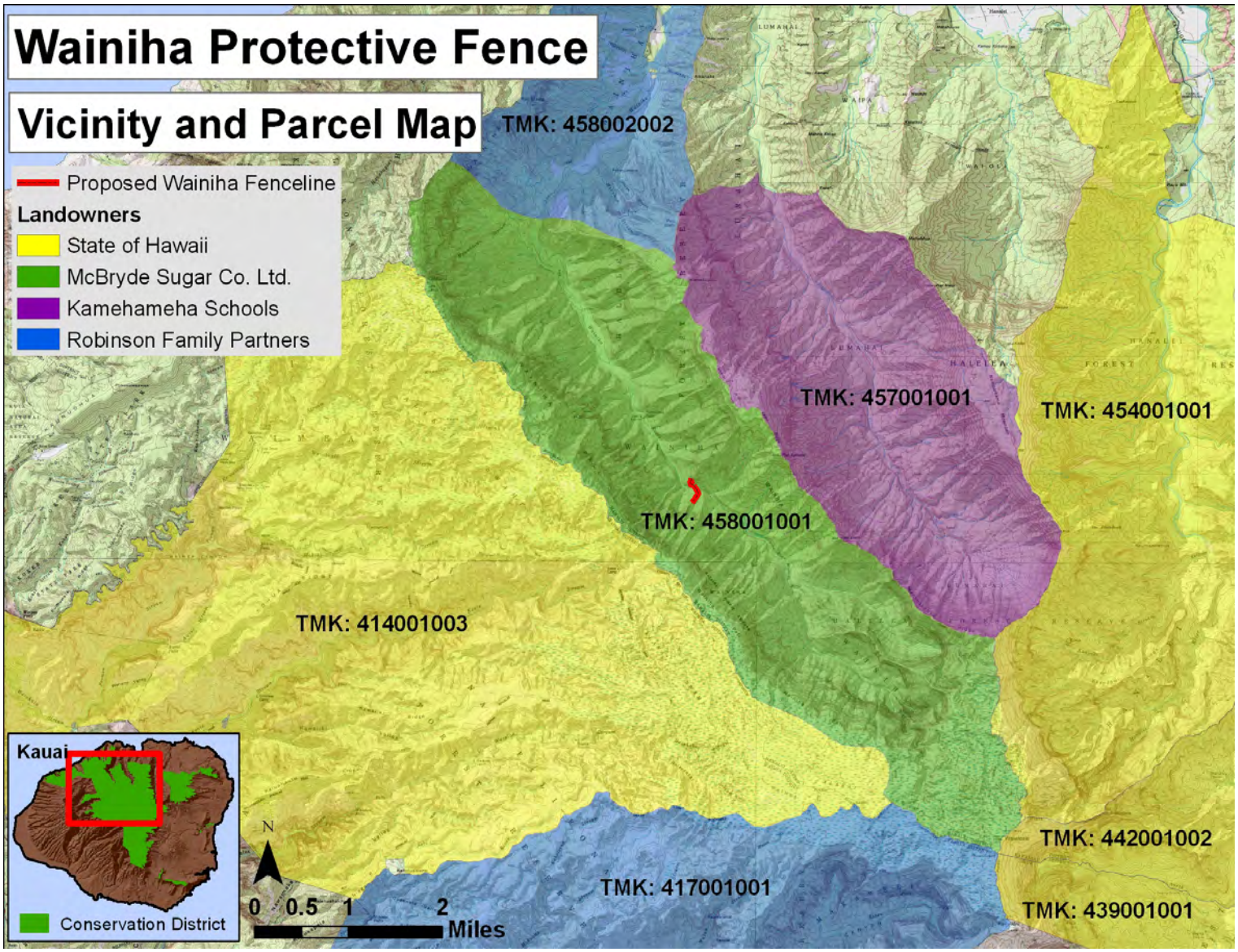

Wainiha Protective Fence
Vicinity and Parcel Map
Proposed Wainiha Fenceline
Landowners
State of Hawaii
McBryde Sugar Co. Ltd.
Kamehameha Schools
Robinson Family Partners
TMK: 458002002
TMK: 457001001
TMK: 454001001
TMK: 458001001
TMK: 414001003
TMK: 442001002
TMK: 417001001
TMK: 439001001
Kauai
Conservation District
N
0 0.5 1 2
Miles

Exhibit F

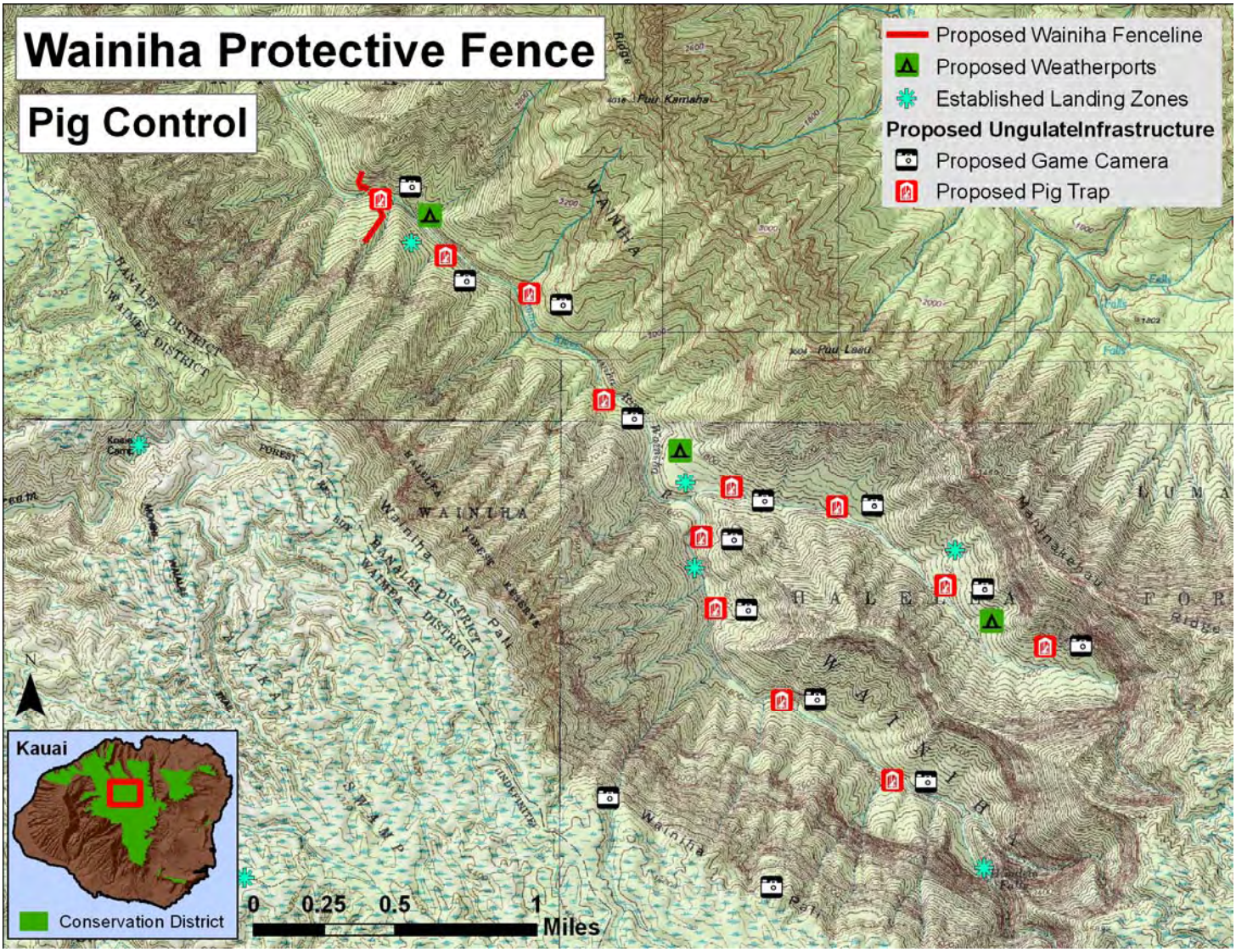
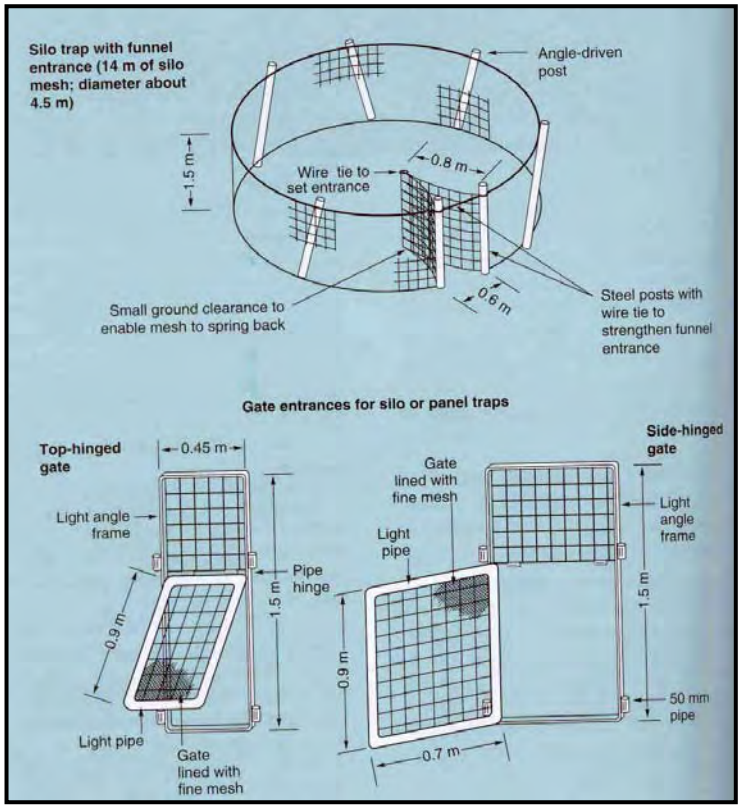

Wainiha Protective Fence
Pig Control
Proposed Wainiha Fenceline
Proposed Weatherports
Established Landing Zones
Proposed UngulateInfrastructure
Proposed Game Camera
Proposed Pig Trap
Kauai
Conservation District
0 0.25 0.5 1 Miles
N

Exhibit G

Silo Trap and Feeder



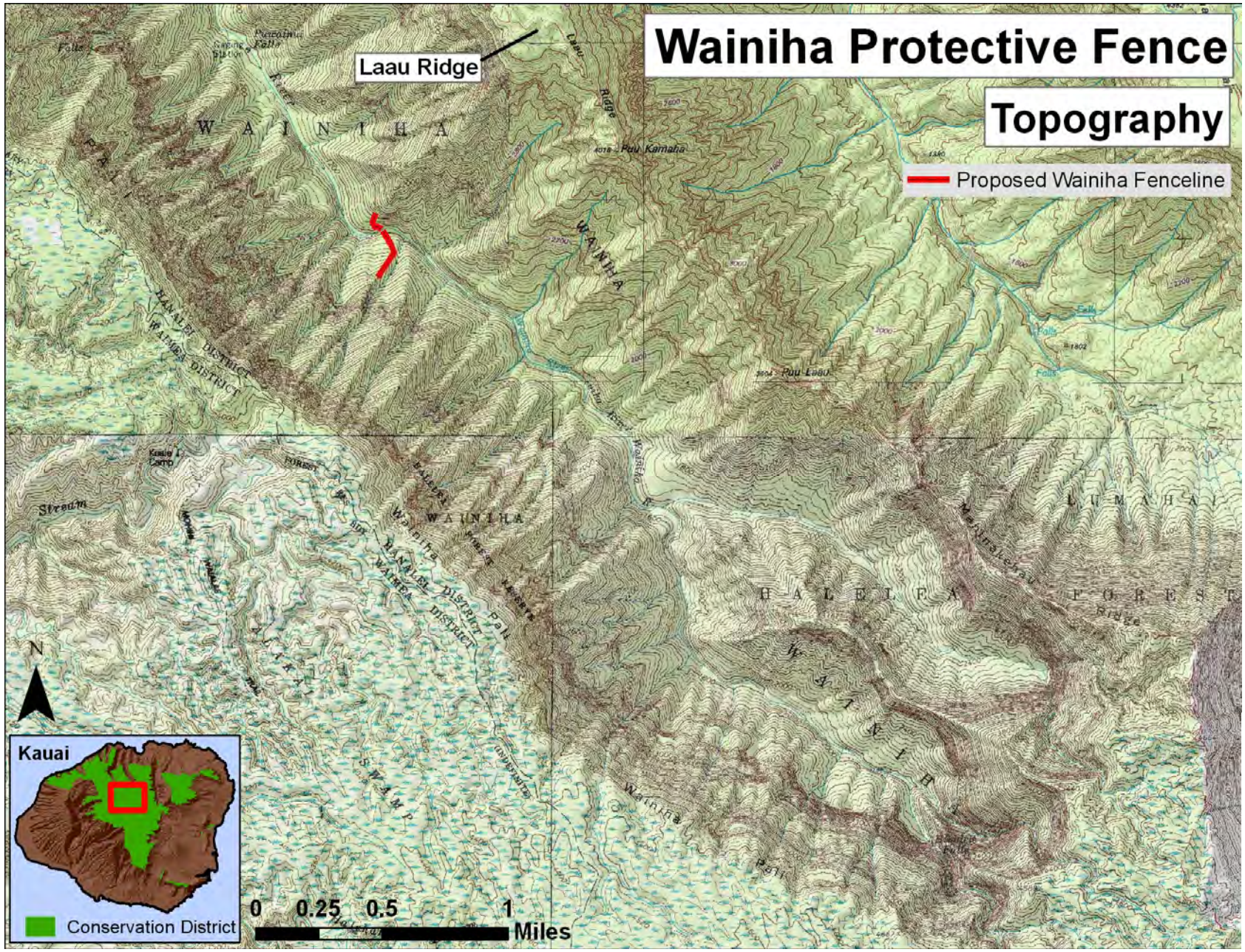

Wainiha Protective Fence
Topography
Proposed Wainiha Fenceline
Laau Ridge
W A I N I H A
Puu Kamaha
Puu Laau
H A L E L E A
F O R E S T
L U M A H A I
Kauai
Conservation District
0 0.25 0.5 1
Miles
N

Exhibit H

Wainiha Fencing Project
Pre-Assessment Mailing List

First Name	Last Name	Title	Organization Address	Address	City	State	Zip
Imai	Aiu		Planning Dept. Kauai County	4444 Rice St.	Lihue	HI	96766
Katie	Cassel		Hui O Laka (KRCP)	P.O. Box 1108	Waimea	HI	96796
Melanie	Chenin		SHPD Administrator	601 Kamokila Blvd. Room 555	Kapolei	HI	96707
John	Chock	Natural Resources Planner/Analyst	Kamehameha Schools	567 South King Street Suite 200	Honolulu	HI	96813
Michelle	Clark		Fish and Wildlife Service	4841 Nounou Road	Kapaa	HI	96746
Paul	Conry	Administrator, Forestry & Wildlife	DLNR - Division of Forestry & Wildlife	P.O. Box 621	Honolulu	HI	96809
David	Craddick	Manager & Chief Engineer	Department of Water	P.O. Box 1706	Lihue	HI	96766
Mike	DeMotta	Assistant Dir Living Collections & Horticulture	National Tropical Botanical Garden	3530 Papalina Rd.	Kalaheo	HI	96741
Larry	Dill	Secretary & Manager	Princeville Utilities	P.O. Box 223040	Princeville	HI	96722
Kaipo	Duncan		Department of Hawaiian Home Lands	P.O. Box 1879	Honolulu	HI	96805
Holly	Dyre		Namahana	200 Chambers St., Apt 5N	New York	NY	10007
Lisa	Ferentinos		DLNR Forestry & Wildlife	1151 Punchbowl St. Rm 325	Honolulu	HI	96813
Kalani	Fronda	Asset Manager	Kamehameha Schools	567 South King Street Suite 200	Honolulu	HI	96813
Howard	Greene	Director of Environmental Compliance	Gay & Robinson, Inc.	P.O. Box 156	Kaumakani	HI	96747
Nick	Holmes	Coordinator	Kauai Endangered Seabird Recovery Project	P.O. Box 458	Waimea	HI	96796
Arryl	Kaneshiro	Project Specialist	Grove Farm Land Corp.	3-1850 Kaumualii Hwy.	Lihue	HI	96766
Aletha	Kaohi		West Kaua'i Visitor Center	P.O. Box 109	Waimea	HI	96796
Sabra	Kauka			P.O. Box 3870	Lihue	HI	96766
Kehaulani	Kekua	Kumu Hula	Halau Palahiwa O Kaipuwai	P.O. Box 1261	Kapaa	HI	96746
Walter	Kortschak		Jurassic Kahili Ranch	499 Hamilton Ave.	Palo Alto	CA	94301
Alvin	Kyono	Forestry Manager	DLNR - Division of Forestry & Wildlife	3060 Eiwa Street	Lihue	HI	96766
Sam	Lemmo		DLNR - Office of Conservation & Coastal Land	P.O. Box 621	Honolulu	HI	96809
David	Leonard	Wildlife Biologist	DLNR - Division of Forestry & Wildlife	1151 Punchbowl St. Rm 325	Honolulu	HI	96813
Kepa	Maly		Cultural Historian & Resource Specialist	P.O. Box 631599	Lanai City	HI	96763
Tom	McCloskey		Kauai Ranch LLC	P.O. Box 539	Anahola	HI	96703
Thomas	Oi	Land Manager	DLNR - Land Division	3060 Eiwa Street	Lihue	HI	96766
Benton	Pang	USFWS	US Fish & Wildlife	300 Ala Moana Blvd. Rm 3-122	Honolulu	HI	96850
Jeff	Rivera		Kauai Ranch LLC	P.O. Box 510163	Kealia	HI	96751
Kaliko	Santos	Community Resource Coordinator	Office of Hawaiian Affairs	2970 Kele Street, Ste. 113	Lihue	HI	96766
Tom	Shigemoto	Vice President	A & B Properties Inc.	P.O. Box 178	Eleele	HI	96705
Stacey	Sproat-Beck		Waipa Foundation	P.O. Box 1189	Hanalei	HI	96714
Michelle	Swartman	Community Development Manager	Lihue Land Company	3-1850 Kaumualii Hwy.	Lihue	HI	96766
Jeyan	Thirugnanam	Lead Planner	DLNR - Office of Environmental Quality Control	P.O. Box 3378	Honolulu	HI	96801
Presley	Wann		Burial Council	161 Lihau St.	Kapaa	HI	96746
Namaka	Whitehead	Ecologist	Kamehameha Schools-Land Assets Division	78-6831 Ali'I Drive, Suite 235	Kailua-Kona	HI	96740
Chipper	Wichman		National Tropical Botanical Garden	3530 Papalina Rd.	Kalaheo	HI	96714
Ken	Wood			P.O. Box 745	Eleele	HI	96705

Exhibit I

RECEIVED DEC 0 0 2009

Exhibit J

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

December 3, 2009

Mr. Allan Rietow
The Nature Conservancy of Hawaii
4180 Rice Street, Suite 102B
Lihue, Hawai'i 96766

LOG NO: 2009.4630
DOC NO: 0912NM06
Archaeology

Dear Mr. Rietow:

SUBJECT: Chapter 6E-42 Historic Preservation Review – DRAFT Environmental Assessment— Wainiha Valley Conservation Project Wainiha Ahupua'a, Hanalei District, Kauai, Hawai'i TMK: (4) 5-8-001: 001

Thank you for providing the opportunity to comment on this DRAFT Environmental Assessment which we received on November 25, 2009. We concur that there will be **"no historic properties affected"** by this project since an archaeological inventory survey was conducted by TS Dye and Colleagues and no historic properties were found.

Please contact me at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO)
Archaeology and Historic Preservation Manager

Cc: OEQC, 235 South Beretania St, Room 702 Honolulu, HI 96813

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Nancy A. McMahon
Archeological & Historic Preservation Manager
State of Hawaii
Department of Land &Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawai'i 96807

RE: Reply to Comment Letter Dated December 3, 2009 for The Wainiha Protective Fencing Project DEA.

Aloha e Nancy McMahon,

Thank you very much for your letter of which concurs that "no historic properties affected" by this project.

In addition, should iwi kupuna or Native Hawaiian cultural or traditional deposits be found during the construction of the project, work will cease, and the appropriate agencies will be contacted.

Thank you again. Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

Exhibit J

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD09/4755

December 24, 2009

Allen Rietow
4180 Rice Street
Līhu'e, HI 96766

RE: Request for preliminary comments on Wainiha Valley Conservation Project draft environmental assessment (DEA), Kaua'i, TMK: 5-8-001:001.

Aloha e Allen Rietow,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated November 24, 2009. OHA has reviewed the project and offers the following comments.

OHA understands that the Nature Conservancy (TNC), with the approval of the landowner; A & B Hawai'i, Inc., proposes to construct a fence to prevent ingress of feral ungulates into a portion of the Wainiha preserve. Upon completion of the fence, TNC will conduct ungulate control and monitoring activities to eliminate feral ungulates from within the fenced area. These activities, along with invasive plant survey and control work, will preserve the existing healthy structure and function of the Wainiha Valley watershed and native Hawaiian forest ecosystem. OHA also notes that there will be monitoring at regular intervals to control incidental weed introduction at the site.

Additionally, we see that there are no archeological sites in the immediate project area and that care will be taken to retain traditional access, such as to gather native plant material for hula and other Hawaiian arts. As such, we offer our support of this project as we understand it. We do suggest, however, that TNC use local workers and in particular local hunters for the ungulate removal portion of this proposal if possible.

Thank you for the opportunity to comment. If you have further questions, please contact Grant Arnold by phone at (808) 594-0263 or e-mail him at granta@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Chief Executive Officer

C: OHA Kaua'i CRC

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Clyde W. Namu'o, Chief Executive Officer
State of Hawaii
Office of Hawaiian Affairs
711 Kapi'olani Blvd., Suite 500
Honolulu, Hawai'i 96813

RE: Reply to Office of Hawaiian Affairs Comment Letter Dated December 24, 2009 for The Wainiha Protective Fencing Project DEA.

Aloha e Clyde Namu'o,

Thank you very much for taking time to forward your comments. We also thank the Office of Hawaiian Affairs for their support for the project.

To respond to several of your comments, we will be installing 2 gates to accommodate anyone accessing the area and to allow for easy access to the fenced area. We plan to remove as many feral pigs by means of baited traps prior to using staff or hunters, both of which will be Kauai residents.

As a note, we have hired a Kaua'i local contractor and crew to construct the 4 mile fence in the eastern Alaka'i plateau we have already received a permit for. We are glad this was accomplished as we value supporting our local community especially during these hard times.

In addition, should iwi kupuna or Native Hawaiian cultural or traditional deposits be found during the construction of the project, work will cease, and the appropriate agencies will be contacted.

Thank you again. Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

ALEXANDER & BALDWIN, INC.

December 22, 2009

Mr. Allan Rietow
Kauai Field Representative
The Nature Conservancy of Hawaii
4180 Rice Street
Lihue, Kauai 96766

Subject: Pre-Consultation on Environmental Assessment for the Wainiha Valley Conservation project

Dear Mr. Rietow:

Thank you for the opportunity to comment on the subject project and the Pre-Assessment Draft Environmental Assessment (DEA). Alexander & Baldwin, Inc. (A&B) strongly supports The Nature Conservancy's conservation efforts in Wainiha Valley.

A&B has the following comments regarding the DEA and associated documents.

1. The DEA refers to A&B Hawaii, Inc. as the landowner of the affected parcel and contains numerous references to A&B Hawaii throughout. The archaeological survey report also contains references to A&B Hawaii, as do the maps included in the Exhibits. A&B Hawaii, Inc. was formerly a subsidiary of A&B but A&B Hawaii, Inc. no longer exists. Therefore, references to A&B Hawaii, Inc. should be changed throughout the documents to either "McBryde Sugar Company, Ltd." or to "Alexander & Baldwin, Inc.", as appropriate. McBryde Sugar Company, Ltd. (McBryde) is the legal owner of the affected parcel (TMK No. (4) 5-8-001-001) and is also the owner of the Wainiha hydroelectric power plant (Kauai Coffee Company (KCOF) operates the plant). Alexander & Baldwin, Inc. is the parent company of McBryde and KCOF.
2. Table 2 of the DEA indicates that there is critical habitat for the Newcomb's snail (*Erinna newcombi*) within the fence project area. The U.S. Fish and Wildlife Service proposed but did not designate critical habitat for the Newcomb's snail in Wainiha Valley (see 67 Fed. Reg. 54026; August 20, 2002). This species should therefore be deleted from Table 2.
3. The DEA states that Wainiha Valley is home to the Newcomb's snail, a threatened species. According to the "Recovery Plan for the Newcomb's Snail (*Erinna newcombi*)" (U.S. Fish and Wildlife Service; May 4, 2006), the current known range of Newcomb's snail is limited to sites located within six stream systems in north- and east-facing drainages on Kauai. They are: Kalalau Stream, Lumahai River, Hanalei River, Kealia Stream, Makaleha Stream, and the North Fork Wailua River. While the Newcomb's snail was historically known from Wainiha Valley, the Recovery Plan indicates that the snail is believed to be extirpated from Wainiha Valley. A&B is not aware of any new

Environmental Affairs • P.O. Box 266 • Puunene, Hawaii 96784 • Telephone (808) 877-2959 • Fax (808) 871-7663

populations of Newcomb's snail having been identified in Wainiha Valley since the Recovery Plan was prepared. The most recent update to the State of Hawaii Department of Land and Natural Resources, Division of Aquatic Resources' *Atlas of Hawaiian Watersheds and their Resources* (April 2008), reflecting DAR biotic sampling efforts through 2005, also indicates that no populations of Newcomb's snail have been identified in Wainiha Valley.

Again, A&B appreciates the opportunity to provide comments. If you have any questions, please feel free to call me at (808) 877-2959.

Sincerely,

Sean M. O'Keefe
Director, Environmental Affairs
Alexander & Baldwin, Inc.

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Sean M. O'Keefe
Director, Environmental Affairs
Alexander &Baldwin Inc.
Environmental Affairs
P.O. Box 266
Puunene, Hawaii 96784

RE: Reply to Comment Letter Dated December 22, 2009 for The Wainiha Protective Fencing Project DEA.

Dear Sean O'Keefe,

Thank you very much for this letter expressing Alexander & Baldwin's strong support for this project. As the landowner of the subject parcel and a member of the Kauai Watershed Alliance, your vote of confidence for this project is very well received! The Nature Conservancy, as the coordinator for the KWA, will continue to work hard to preserve our mauka watersheds and native Hawaiian forests.

In response to your comments we offer the following:

1. Corrections will be made to all references within the DEA and Exhibits that refer to A&B Hawaii, Inc. The correct name, McBryde Sugar Company, Ltd. will be used throughout the DEA and associated documents. In addition, we have requested that the author of the Archeological Survey please make this correction also.
2. Newcomb's Snail (*Erinna newcombi)* will be deleted from Table 2 of the DEA.
3. The DEA will be revised and will no longer state that Wainiha Valley is home to the Newcomb's Snail (*Erinna newcombi)*, a threatened species.

Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

cc.: Tom Shigmoto

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

RECEIVED DEC 1 1 2009

Exhibit J

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:DH

Correspondences: OA-10-118

DEC 10 2009

Allan Rietow,
Kauai Program Field Representative
The Nature Conservancy
Kauai Program Office
4180 Rice Street, Suite 102B
Lihue, Hawaii 96766

Dear Mr. Rietow,

SUBJECT: Wainiha Valley Fence Project on Island of Kauai

The Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) is in receipt of your letter, dated November 24, 2009, regarding pre-consultation on the Draft Environmental Assessment (DEA) for the proposed Wainiha Valley fence project, Island of Kauai, Subject Parcel TMK: (4) 5-8-001:001. The proposed project involves constructing a 489 meters (0.3 miles/1,604 feet) linear fence, clearing vegetation and assembling three (3) weather port/shelters.

The OCCL notes the proposed use is an identified land use, pursuant to Hawaii Administrative Rules (HAR), Section 13-5-22, identified land uses in the Protective subzone, P-7, SANCTUARIES, plant and wildlife sanctuaries, natural area reserves (see Chapter 195, HRS) and wilderness and scenic areas, including habitat improvements under an approved Management Plan. A Conservation District Use Application (CDUA) will need to be submitted and processed; this is a Board Permit. A Public Hearing will also be required, pursuant to HAR, Section 13-5-40(a), HEARINGS.

Should you have any questions, please contact Dawn Hegger of the Office of Conservation and Coastal Lands at 587-0380.

Aloha,

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

c: KDLO
County of Kauai
DOFAW – P. Conry/I. Ferentinos

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Samuel J. Lemmo, Administrator
State of Hawaii
Department of Land &Natural Resources
Office of Conservation & Coastal Lands
Post Office Box 621
Honolulu, Hawai'i 96807

RE: Reply to Comment Letter (OA-10-118) Dated December 10, 2009 for The Wainiha Protective Fencing Project DEA.

Aloha e Samuel Lemmo,

Thank you very much for your letter.

A Conservation District Use Application will be submitted to the appropriate approving agency. A public hearing and an appearance before the Board of Land and Natural Resources will also be scheduled as part of the permitting process.

Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

Exhibit J

Department of Water County of Kaua'i

Water has no substitute.....Conserve it

December 28, 2009

UID #5593

Mr. Allan Rietow
The Nature Conservancy
4180 Rice Street, Suite 102B
Lihue, HI 96766

Dear Mr. Rietow:

Subject: Review of the Draft Environmental Assessment for the Proposed Wainiha Valley Protective Fence Project, TMK: 5-8-01:001, Wainiha, Kaua'i

This is in regard to your e-mail dated December 24, 2009 that provided information on the above subject matter. We support the Wainiha Valley Protective Fence Project that is, among other goals, anticipated to preserve the existing healthy structure and function of the Wainiha Valley watershed and native Hawaiian forest ecosystem.

The project is located in an area where the DOW does not have a domestic water system and the applicant should be made aware that prior to the DOW granting building permit approval(s) for the proposed project the applicant will be required to sign and execute a "Waiver and Release Agreement".

If you have any question, please contact Mr. Edward Doi at (808) 245-5417.

Sincerely,

Edward Doi

for Gregg Fujikawa
Chief of Water Resource and Planning Division

ED:loo
Pre-Draft EA - Wainiha Valley Protective Fence Project – 12-24-09 - Rietow

4398 Pua Loke St., P.O. Box 1706, Lihue, HI 96766 Phone: 808-245-5400
Engineering and Fiscal Fax: 808-245-5813, Operations Fax: 808-245-5402, Administration Fax: 808-246-8628

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Edward Doi
Department of Water
County of Kauai
P.O. Box 1706
Lihue, Hawaii 96766

RE: Reply to Comment Letter (UID #5593) Dated December 28, 2009 for The Wainiha Protective Fencing Project DEA.

Dear Edward Doi,

Thank you very much for the Water Department's letter supporting this project with the objectives of preserving the Wainiha watershed and Hawaiian forest ecosystem.

If required a "Waiver and Release Agreement" will be executed.

Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

Exhibit J

NATIONAL TROPICAL BOTANICAL GARDEN
Chartered by Congress to Create a National Resource in Conservation, Research, and Education

December 21, 2009

Mr. Allan Rietow
The Nature Conservancy
4180 Rice Street, Suite 102B
Lihue, HI 96766

Dear Allan,

Subject: Wainiha Valley Conservation Fence Project, Kauai 2010

Mahalo for the opportunity to review the DEA on the proposed construction of a 1,600 ft fence in Wainiha Valley in 2010. Projects of this nature are very important in the protection of Kaua'i's watersheds and it is will the full support of NTBG that I am writing this letter.

As a member of the KWA, we are in full support of the new proposed Wainiha Valley conservation effort and the application of the Conservation District Use Permit from the DLNR needed to proceed with this work. The Nature Conservancy has acted as coordinators for the KWA since 2005 and has worked tirelessly to further the reach and impact of the KWA and the realization of the long-term protection of Kauai's upper watershed areas as expressed in our KWA Management Plan. They have a proven track record of assessing our needs and then transferring those needs into viable projects. Active watershed management is the key to the continual supply of fresh water for our residents of Kaua'i.

Thank you for considering this letter of support for the protection of Kauai's watershed.

Mahalo,

Chipper Wichman, CEO and Director - National Tropical Botanical Garden
Chairman, Kaua'i Watershed Alliance

NATIONAL HEADQUARTERS 3530 Papalina Road, Kalāheo, Hawai'i 96741 USA · (808) 332-7324 · Fax (808) 332-9765 · www.ntbg.org

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Chipper Wichman
CEO and Director
National Tropical Botanical Garden
3530 Papalina Road
Kalaheo, Hawaii 96741

RE: Reply to Comment Letter Dated December 21, 2009 for The Wainiha Protective Fencing Project DEA.

Aloha e Chipper Wichman,

Thank you very much for your letter supporting this project. We strongly agree that active watershed management is the key to the continual supply of fresh water Kaua'i.

Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

Ben Dyre Family Limited Partnership
PO Box 40
Kilauea, HI 96754

December 16, 2009

Re: Wainiha Valley Conservation Project, Kauai 2010

To Whom It May Concern:

We wish to express our support for the proposed project in 2010 for the construction of the 1600 ft (approx) fence in the Wainiha Valley.

The Ben Dyre Family Limited Partnership has been a part of the Kauai Watershed Association (KWA) since its formation in 2003. Throughout this alliance, the Nature Conservancy has been extremely diligent in its research and pre-planning of similar projects in the past. They are successful at implementation and thoroughly monitoring the ongoing projects on Kauai. The Environmental Assessment prepared by the Nature Conservancy for the Wainiha Valley project is explicit in its obligation to protecting Kauai's watershed.

As a member of the KWA, we are in full support of the new proposed Wainiha Valley conservation effort and the application of the Conservation District Use Permit from the DLNR needed to proceed.

Sincerely,

Holly Dyre

General Partner of the Ben Dyre Family Limited Partnership

Exhibit J

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

January 8, 2010

Holly Dyre
Ben Dyre Family Limited Partnership
P.O. Box 40
Kilauea, Hawaii 96754

RE: Reply to Comment Letter Dated December 16, 2009 for The Wainiha Protective Fencing Project DEA.

Dear Holly Dyre,

Thank you very much for your letter supporting this project. The Nature Conservancy as the coordinator for the KWA will continue to work hard to preserve our mauka watersheds and native Hawaiian forests. Our hope is they will remain protected for generations to come.
Please contact me if you have any additional comments, questions or concerns.

Sincerely,

Allan Rietow
Field Representative
The Nature Conservancy

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

			Draft EA Consulted Agencies & Parties						
First Name	**Last Name**	**Title**	**Organization Address**	**Address**	**City**	**State**	**Zip**	**Status**	
Imai	Aiu		Planning Dept. Kauai County	4444 Rice St.	Lihue	HI	96766	M	
Sara	Bowen		West Kauai Soil Water Conserservation District	4334 Rice Street	Lihue	HI	96766	R	
Katie	Cassel		Hui O Laka (KRCP)	P.O. Box 1108	Waimea	HI	96796	R	
Melanie	Chenin		SHPD Administrator	601 Kamokila Blvd. Room 555	Kapolei	HI	96707	M	
John	Chock	Natural Resources Planner/Analyst	Kamehameha Schools	567 South King Street Suite 200	Honolulu	HI	96813	R	
Michelle	Clark		Fish and Wildlife Service	4841 Nounou Road	Kapaa	HI	96746	R	
Paul	Conroy	Administrator, Forestry & Wildlife	DLNR - Division of Forestry & Wildlife	P.O. Box 621	Honolulu	HI	96809	M	
Ian	Costa	Planning Director	County of Kaua'i Planning Dept.	4444 Rice St. Suite 473	Lihue	HI	96766	M	
David	Craddick	Manager & Chief Engineer	Department of Water	P.O. Box 1706	Lihue	HI	96766	R	
Mike	DeMotta	Assistant Dir Living Collections & Horticulture	National Tropical Botanical Garden	3530 Papalina Rd.	Kalaheo	HI	96741	R	
Larry	Dill	Secretary & Manager	Princeville Utilities	P.O. Box 223040	Princeville	HI	96722	R	
Kaipo	Duncan		Department of Hawaiian Home Lands	P.O. Box 1879	Honolulu	HI	96805	R	
Tom	Dye		T.S. Dye & Colleagues, Archaeologists, Inc.	735 Bishop St., Suite 315	Honolulu	HI	96813	M	
Holly	Dyre		Namahana Farms	200 Chambers St., Apt 5N	New York	NY	10007	R	
Lisa	Ferentinos		DLNR Forestry & Wildlife	1151 Punchbowl St. Rm 325	Honolulu	HI	96813	M	
Jay	Furfaro	The Honorable	Kauai County Council	4396 Rice St.	Lihue	HI	96766	O	
Howard	Greene	Director of Environmental Compliance	Gay & Robinson, Inc.	P.O. Box 156	Kaumakani	HI	96747	R	
Keren	Gundersen		Kauai Invasive Species Committee	P.O. Box 1863	Kapaa	HI	96746	**O**	
Nick	Holmes	Coordinator	Kauai Endangered Seabird Recovery Project	P.O. Box 458	Waimea	HI	96796	M	
Mark	Hubbard			2420 Kanio	Lihue	HI	96766	O	
Ted	Inouye	District Chair	East Kaua'i Soil & Water Conservation	P.O. Box 278	Hanamaulu	HI	96715	R	
Arryl	Kaneshiro	Project Specialist	Grove Farm Land Corp.	3-1850 Kaumualii Hwy.	Lihue	HI	96766	R	
Ezra	Kanoho			2755 Kepa St.	Lihue	HI	96766	O	
Aletha	Kaohi		West Kaua'i Visitor Center	P.O. Box 109	Waimea	HI	96796	R	
Wayne	Katayama	President	Kauai Coffee Company	P.O. Box 530	Kalaheo	HI	96741	R	
Sabra	Kauka			P.O. Box 3870	Lihue	HI	96766	R	
Kehaulani	Kekua	Kumu Hula	Halau Palahiwa O Kaipuwai	P.O. Box 1261	Kapaa	HI	96746	R	
Walter	Kortschak		Jurassic Kahili Ranch	499 Hamilton Ave.	Palo Alto	CA	94301	R	
Sam	Lemmo		DLNR - Office of Conservation & Coastal Land	P.O. Box 621	Honolulu	HI	96809	M	
David	Leonard	Wildlife Biologist	DLNR-Division of Forestry & Wildlife	1151 Punchbowl St. Rm 325	Honolulu	HI	96813	M	
Kepa	Maly		Cultural Historian & Resource Specialist	P.O. Box 631599	Lanai City	HI	96763	R	
Tom	McCloskey		Kauai Ranch LLC	P.O. Box 539	Anahola	HI	96703	R	
Hermina	Morita	The Honorable	State House of Representatives	415 S. Beretania St.	Honolulu	HI	96813	O	
Leland	Nishek		Kauai Landscaping, Inc.	3-1550 Kaumualii Hwy.	Lihue	HI	96766	R	
Thomas	Oi	Land Manager	DLNR - Land Division	3060 Eiwa Street	Lihue	HI	96766	R	
Jerry	Ornellas	President	East Kaua'i Water Users Cooperative	P.O. Box 800	Kapaa	HI	96746	O	
Roy	Oyama	President	Kaua'i Farm Bureau	P.O. Box 3895	Lihue	HI	96766	O	
Benton	Pang	USFWS	US Fish & Wildlife	300 Ala Moana Blvd. Rm 3-122	Honolulu	HI	96850	M	
David	Pratt			2741 Nokekula Circle	Lihue	HI	96766	O	
Lex	Riggle	District Conservationist	Dept. of Agriculture NRCS	4334 Rice Street Suite 103	Lihue	HI	96766	R	
Jeff	Rivera		Kauai Ranch LLC	P.O. Box 510163	Kealia	HI	96751	R	
Kaliko	Santos	Community Resource Coordinator	Office of Hawaiian Affairs	2970 Kele Street, Ste. 113	Lihue	HI	96766	R	
Patsy	Sheehan		c/o Hanalei Land Company	P.O. Box 81	Hanalei	HI	96714	O	
Tom	Shigemoto	Vice President	A & B Properties Inc.	P.O. Box 178	Eleele	HI	96705	M	
Gary	Smith		Open Space Committee	P.O. Box 750	Kilauea	HI	96754	O	
Stacey	Sproat-Beck		Waipa Foundation	P.O. Box 1189	Hanalei	HI	96714	R	
Michelle	Swartman	Community Development Manager	Lihue Land Company	3-1850 Kaumualii Hwy.	Lihue	HI	96766	R	
Peter	Tausend	District Chair, West Kaua'i Soil & Water Conservation	Pioneer Hi-Bred Research	P.O. Box 609	Waimea	HI	96796	R	
Jeyan	Thirugnanam	Lead Planner	DLNR - Office of Environmental Quality Control	P.O. Box 3378	Honolulu	HI	96801	M	
Presley	Wann		Burial Council	161 Lihau St.	Kapaa	HI	96746	R	
Stuart	Wellington			P.O. Box 628	Kapaa	HI	96746	O	
Namaka	Whitehead	Ecologist	Kamehameha Schools-Land Assets Division	78-6831 Ali'I Drive, Suite 235	Kailua-Kona	HI	96740	R	
Chipper	Wichman		National Tropical Botanical Garden	3530 Papalina Rd.	Kalaheo	HI	96714	R	
Ken	Wood			P.O. Box 745	Eleele	HI	96705	M	
Mike	Wysong	Forestry Manager	DLNR - Division of Forestry & Wildlife	3060 Eiwa Street	Lihue	HI	96766	M	
JoAnn	Yukimura			2749 Kapena St.	Lihue	HI	96766	O	
		Lihue Public Library		4344 Hardy St.	Lihue	HI	96766	M	
Key									
M = Mandatory									
R = Recommended									
O = Optional									

Exhibit K

Exhibit K

Exhibit L

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 8, 2010

Katherine Kealoha, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Kealoha,

Subject: Draft Environmental Assessment for The Wainiha Conservation Project
TMK 4-5-8-001-001, Hanalei District, Kaua`i, Hawai`i

The Department of Land and Natural Resources has reviewed the draft environmental assessment for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish notice of availability for this project in the next available OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and one (1) copy of the document in pdf format on a CD; and one (1) hardcopy of the Draft EA. Please call Lisa Ferentinos at 586-0917or Lisa.Ferentinos@hawaii.gov if you have any questions.

Sincerely,

Paul J. Conry, Administrator
Division of Forestry and Wildlife

Exhibit M

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 24, 2010

Allen Rietow
Kauai Field Representative
The Nature Conservancy of Hawaii
4180 Rice Street
Lihue, HI 96766

Subject: Draft Environmental Assessment (DEA): The Wainiha Conservation Project

Thank you for the opportunity to review the subject DEA. The Division of Forestry and Wildlife offers the following comments:

1. Please provide a detailed description of how materials brought to the project site will be treated to prevent the introduction of non-native species. Also include the protocol that the fence construction contractor will be required to follow to prevent accidental introductions from workers' tools and clothing.

2. After removal of the weatherports, the impacted area should be restored. Please provide a brief description of how this will be accomplished.

3. Please indicate the location of planned water bars and any new landing zones.

4. The native laua`e fern (*Micorsorum spectrum*) is not officially considered rare. On page 6 please replace "rare" with "rarely found endemic" or similar wording. If species in Table 1 are part of the Hawaii Plant Extinction Prevention (PEP) program, please indicate and mention if the PEP program is working with these species in Wainiha Valley. You can contact Wendy McDowell, Kauai PEP Coordinator at (808) 634-0300 or wmcdowe@hotmail.com.

5. DOFAW requests that the watershed partnership explore further opportunities for the incorporation of public and volunteer hunters into project on their lands.

6. On page 12, please include the weaving of electric polytape in the top fence wire.

7. Please indicate that you will follow the US Fish and Wildlife Service's protocol when dead seabirds or bats are found.

Sincerely,

Paul J. Conry
Administrator, Division of Forestry and Wildlife

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

April 23, 2010

Paul J. Conry
Administrator, Division of Forestry and Wildlife
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Wainiha Conservation Project – Draft Environmental Assessment
Response to Division of Forestry and Wildlife letter dated March 24, 2010

Aloha e Paul Conry,

Thank you for your comments as listed from 1 to 7. Please accept the following responses numbered from 1 to 7 (as numbered in your letter):

1. This description of how materials will be treated to prevent the introduction of non-native species as well as a protocol for the contractor to follow to prevent introductions of non-native species are located within the text of the draft EA, see section V. Proposed Mitigation Measures, B. Weed Introductions. Please let us know how we may improve upon this section should it not address your concerns properly.

2. The DEA states up to 3 weatherports would be assembled within the project area. Their foot print would equal approximately 450 sq. ft (0.01 ac.) in each of 3 separate locations or a total of 1,350 sq. ft. (0.03 ac). All of the construction materials and rubbish will be cleaned up and removed from the sites. The sites will be planted with native species in the area and then be left to regenerate. In addition, these sites will be monitored every 6 months and any non-native species will be removed. If the grade beneath the removed weatherport(s) is greater than 30%, waterbars will be installed to prevent erosion.

3. The location of water bars will be placed and spaced appropriately to eliminate or reduce possibilities for erosion within areas of the fence alignment that would be subject to erosion. The location of all waterbars will be within the fence alignment corridor and placed along erosion-prone sections of the fence line. The placement will be determined after the fence is installed. There are no new landing zones.

4. The correction for Laua'e fern will be made in the final EA, however, the use and meaning of the word "rare" in this context [the second sentence of the second to the last paragraph located on page 6] is one of a standard English definition meaning "seldom found" or "uncommon" and is not meant to include it in any category of "Rare" or "Endangered" as might be used scientifically or in a category of protected plants by the USFWS as an example. The final EA, Table 1 will be corrected to designate PEP species. The PEP program staff are aware of these species located within the Wainiha preserve, but are not actively working with these species at this time. We already know Wendy McDowell and thank you for

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

including Wendy's contact information. We hope to work with the PEP program in Wainiha during the long term management of the Preserve.

5. The Kaua'i Watershed Alliance will continue to assist DOFAW in exploring opportunities for public hunting.

6. Within section II. Summary of Proposed Actions, B. Project Description and Location and section V. Proposed Mitigation Measures, C. Ground Nesting Seabirds and Bats the language " weaving of electric polytape in the top fence wire" will be included as an addition to the text within the final EA.

7. The protocol, as defined by the US Fish and Wildlife Service, will be included within section V. Proposed Mitigation Measures, C. Ground Nesting Seabirds and Bats of the Final EA.

Thank you again for taking time to evaluate this project. Please contact us if you have any additional questions or concerns or comments.

Best regards,

Allan Rietow
Field Representative
The Nature Conservancy

Cell: 808-639-7544

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

Exhibit M

Mar 1, 2010

To whom it may concern:

This letter will serve as my public testimony in support of The Nature Conservancy, Kaua'i Watershed Alliance and related parties in their collective effort to protect and preserve approximately 7050 acres of our unique native forest system at Wainiha, Kaua'i .

Our native forests are under siege largely due to the introduced mammals such as feral pigs and goats. It is obvious that fencing such a large area requires a coordinated effort and some degree of disturbance to our fragile native forest. This fencing project minimizes that disturbance by utilizing the naturally steep valley walls on the south,east and west boundaries.

Inaction only increases the degradation and threatens our Wainiha watershed. If it is not done now, we will ultimately raise the need for this fencing project and rue the day we procrastinated on it. The health of Hawaii's native forest and the outlook for future improvements are heavily reliant on controlling invasives. The fence is an integral part of it and further is the start for most protection efforts.

Although this letter represents my own personal opinion, I hope this letter has impact on your decision. As a life long resident of Hawaii and a keen observer and supporter of our native flora and fauna, I have seen our forests degrade immeasurably. However I am buoyed by the success of the fencing systems utilized at Hawaii Volcanoes National Park and the USFWS fencing and management of Kilauea Point National Wlidlife Refuge. I have involved myself with the later project for over 30 years, yet I remain still in awe with how nature has responded so positively when adequately protected!!

Mahalo nui loa,

Gary E Smith

PO Box 750

Kilauea, HI 96754

reply to: gary@mokihana.com

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

April 23, 2010

Gary E. Smith
P.O. Box 750
Kilauea, Hawaii 96754

Aloha e Gary Smith,

Thank you for your letter dated March 1, 2010 supporting the proposed Wainiha Conservation Project.

Your comments are duly noted and will become a part of the final Environmental Assessment. Your evaluation of the consequences of in-action, backed with your own personal knowledge and observations, as expressed in your letter, fully support the project's mission of protecting native forests and watersheds.

I will keep you updated as to our progress.

Mahalo,

Allan Rietow
Field Representative
The Nature Conservancy

Cell: 808-639-7544

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

RECEIVED MAR 23 2010

Exhibit M

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2010-TA-0177

MAR 22 2010

Mr. Allan Rietow
The Nature Conservancy
Kauai Program Office
4180 Rice St, Suite 102B
Lihue, Hawaii 96766

Subject: Comments on the Draft Environmental Assessment for the Wainiha Conservation Project, Kauai

Dear Mr. Rietow:

Thank you for the opportunity to review the Draft Environmental Assessment (DEA) for the Wainiha Conservation Project on Kauai. We received your letter on February 23, 2010. The Nature Conservancy is coordinating the conservation project for the Kauai Watershed Alliance and proposes to construct a protective hog wire fence to prevent movement of feral pigs into the remote Wainiha Preserve (Preserve). The project is contained within a 10,000 acre (4,047 hectare) parcel owned by McBryde Sugar Company Ltd. (Alexander & Baldwin Properties, Inc.).

The proposed 1,604 feet (489 meter) fence, combined with natural barriers, will function to protect approximately 7,050 acres (2,853 hectares) of native habitat for plants and animals found within the Wainiha watershed. The fence will be built of hog wire fence fabric, hog wire apron (for skirting), galvanized pipes and fence posts. The DEA states that a 10-foot (3.1 meter) wide corridor will be cleared in order to construct a fence 48 inches (122 centimeters) in height. In conjunction with fence construction, three pre-fabricated weather shelters will be erected for use as temporary dwellings for workers. These eight-foot (2.4 meter) high octagons will be assembled on raised platforms. Sites for these shelters and a landing zone used to drop supplies via helicopter will be carefully chosen to avoid sensitive habitat containing native plants.

According to the DEA, eight listed endangered and threatened plants occur within the Preserve. Six additional rare plant species reported from the Perserve were proposed for listing as endangered in 2008. The final listing rule will be published this year. Critical habitat for the endangered plant *Cyrtandra cyanneoides* (mapele) was designated in the project area in 2003. In addition, the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the threatened Newell's shearwater (*Puffinus newelli*) (listed seabirds), nest in Wainiha.

TAKE PRIDE® IN AMERICA

In 2009, The Nature Conservacy conducted a botanical survey along the proposed fence line and found no rare plant taxa. Surveys conducted by the Kauai Endangered Seabird Recovery Project in the same year found no listed seabird burrows along the fence line. Following installation of the fence, proposed management activities include ungulate removal, invasive weed control, fence maintenance and plant recovery monitoring.

Since listed seabirds may transit the area and are known to collide with objects such as powerlines and other structures, we recommend increasing the visibility of the fence by weaving one-inch electric fence polytape through the top row of wire in areas where the fence is the tallest structure. This measure was utilized within a seabird colony on Lanai and to date has proven very successful. To avoid impacts to the endangered Hawaiian hoary bat *(Lasiurus cinereus semotus),* no woody plants suitable for bat roosting should be removed or trimmed during the bat birthing and pup rearing season (April through August) and barbed wire should not be used as a top strand in your final fence design (as stated in the DEA). Dead Hawaiian hoary bats have been observed impaled on fences with strands of barbed wire. Should any dead seabirds or Hawaiian hoary bats or seabirds be found at any time during or after fence installation, the Division of Forestry and Wildlife Kauai Branch, Biologist, and Kauai Endangered Seabird Recovery Project and the U.S. Fish and Wildlife Service should be notified.

We anticipate the fence will provide an overall benefit to native species and watershed protection, and we commend you for your efforts. If, as project planning progresses, you determine the project may adversely impact federally listed species or critical habitat, please contact our office for further assistance. If you have questions regarding these comments, please contact Jodi Charrier, Fish and Wildlife Biologist, (phone: 808-792-9400, fax: 808-792-9581).

Sincerely,

Christa Russell

for Loyal Mehrhoff
Field Supervisor

TAKE PRIDE® IN AMERICA

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Hawai'i
Kaua'i Program
4180 Rice Street, Suite 102B
Līhu'e, Hawai'i 96766

Tel (808) 246-0543
Fax (808) 245-1642

nature.org/hawaii

April 23, 2010

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

Subject: Wainiha Conservation Project, Kauai – Draft DEA
Response to the Fish and Wildlife Service letter dated March 22, 2010 – 2010-TA-0177

Aloha Loyal Mehrhoff,

Thank you for your agency's review of the proposed project and we thank you for your support of the project.

Concerning the comments in the fourth paragraph of the letter:

1. We will, as recommended, increase fence visibility by weaving electric fence polytape or a similar weather resistant tape through the top row of the fence wire mesh within the areas that the fence is the tallest structure.
2. There will be no barbed wire used at all for this project and woody plants suitable for bat roosting will not be trimmed or removed during the months, April through August.
3. Should any dead seabirds or dead Hawaiian bats be discovered during or after the fence installation, the DOFAW Kauai Branch Biologist, Kauai Endangered Seabird Recovery Project and the U.S. Fish and Wildlife Service will be notified.

Thank you again for taking time to evaluate and support this project. Please contact us if you have any additional questions or concerns.

Best regards,

Allan Rietow
Field Representative
The Nature Conservancy

Cell: 808-639-7544

BOARD OF TRUSTEES
S. Haunani Apoliona Peter D. Baldwin Christopher J. Benjamin Zadoc W. Brown, Jr. Carl A. Carlson, Jr. David C. Cole Samuel A. Cooke
Peter H. Ehrman Kenton T. Eldridge Guy Fujimura J. Stephen Goodfellow Thomas Gottlieb James J.C. Haynes Ron Higgins Peter Ho
Stanley Hong J. Douglas Ing Mark L. Johnson Dr. Kenneth Kaneshiro Bert A. Kobayashi, Jr. Faye Watanabe Kurren Duncan MacNaughton
Bonnie McCloskey Bill D. Mills Wayne Minami Michael T. Pfeffer H. Monty Richards Jean E. Rolles Scott Rolles Crystal Rose
James Romig Eric Yeaman

T. S. Dye & Colleagues, Archaeologists, Inc.
735 Bishop St., Suite 315, Honolulu, Hawai'i 96813

An Archaeological Survey for Animal Control Fencing in the Wainiha Preserve, Wainiha Valley, Kaua'i

Kekapala P. Dye and Thomas S. Dye, Ph.D.

January 20, 2010

Contents

1 Introduction **2**
1.1 Survey Area 2
1.2 Environment 3
1.3 Background Research 4
1.4 Previous Archaeology 7

2 Methods **9**

3 Field Survey Results **9**
3.1 Southern Section 9
3.2 Northern Section 9

4 Discussion and Conclusions **10**

Hawaiian Terms **10**

Abbreviations **11**

Bibliography **11**

Illustrations

1 Project area location 3
2 Project area on the north valley wall 4
3 Project area on the south valley wall 4

Abstract

This document presents the results of an archaeological survey of proposed fence lines and other facilities associated with an animal control fencing project in upper Wainiha Valley. No historic sites were found in the proposed fence area and no historic properties will be affected by the animal control fence project.

1 Introduction

At the request of The Nature Conservancy (TNC), T. S. Dye & Colleagues, Archaeologists, Inc.has completed an archaeological survey of proposed fence lines and facilities associated with an animal control fence in the upper Wainiha Valley, Kaua'i. The purpose of the survey was to determine the presence or absence of historic sites in the area that will see activities during construction and maintenance of the animal control fence.

This report sets out the results of the survey, following guidelines established by the State Historic Preservation Division (SHPD) Rules Governing Standards for Archaeological Inventory Survey and Reports (13-276). The document is not intended to be an inventory survey report, however. Designed flexibility in the fencing project meant that historic sites found during the survey could be avoided by re-routing a fence line or relocating a facility. Thus, if a historic site was identified in the field, it would not be necessary to record it in the detail required by the inventory survey rule. The fencing project could easily be redesigned to avoid any adverse effect on historic properties.

The rest of this section identifies the survey area, provides a brief description of the environment, and presents the results of the background research into the history of land use in upper Wainiha Valley.

1.1 Survey Area

The surveyed areas are located in the upper portion of Wainiha Valley in the Halele'a District of Kaua'i (fig. 1). The valley, which is coterminous with the *ahupua'a* of Wainiha, is about 13 miles long. With Hanalei to the east and Lumaha'i to the west, Wainiha is one of the three long valleys with headwaters on the northern slope of Wai'ale'ale. It is identified on tax maps as TMK: (4) 5–8–001:001, with an area of 10,120 ac. This land is owned by McBryde Sugar Co., Ltd.

The surveyed areas for the proposed fence line are set in a narrow portion of Wainiha valley with steep ridge-lines and cliffs surrounding them. This narrow portion of the valley makes access to the back of the valley difficult and undoubtedly would have restricted access in the past. The proposed animal control fence takes advantage of this natural barrier, augmenting it with fences that will hopefully limit the ability of goats and pigs to move into the back of the valley.

The survey consisted of walking the routes of two proposed fence lines. The northern fence line extended approximately 125 m up the slope from the top of a cliff on the bank of the Wainiha stream (fig 2). The southern fence line, the longer of the two, extended from the stream up a ridge-slope to a small rock cliff. The proposed route of the southern fence line was approximately 370 m long (fig 3).

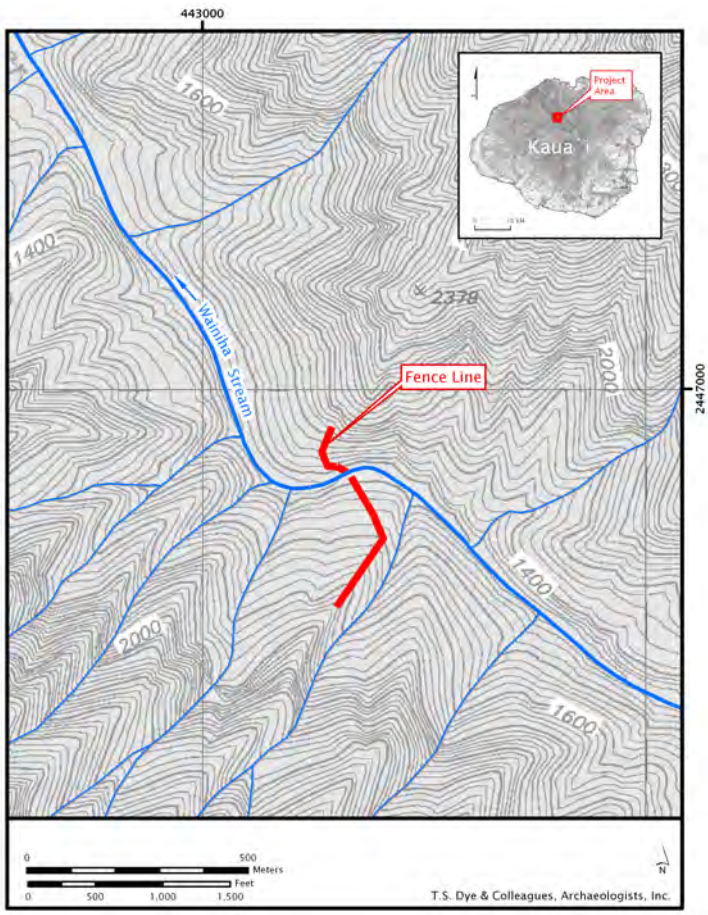


Figure 1. Location of the fence line survey in Wainiha Valley, Kaua'i. GPS locations courtesy of TNC.

1.2 Environment

The project area is located in the upper portion of Wainiha Valley, approximately 9.0–9.5 km from the coast. The survey area is adjacent to the Wainiha stream, the area is wet, with average annual rainfall of 160–200 in. [6:56]. This portion of the valley is covered with a predominantly native forest. At the lower portion of the project area, on the banks of the Wainiha Stream, soils are classified as Kolokolo extremely stony clay loam, which is found on stream bottoms subject to damaging over flow [4]. Throughout the rest of the project area and the entire back of the valley, soils are classified as rough mountainous land, which is accurately described as "very steep land broken by numerous intermittent drainages" [4].

Figure 2. Location of the project area on the north valley wall; *left*, the valley wall; *right*, the stream cliff.

Figure 3. Location of the project area on the south valley wall: *left*, the valley wall; *right*, stream cliff.

1.3 Background Research

Little is known about traditional Hawaiian land use in Wainiha Valley. An early survey of agriculture throughout the islands notes that

> (f)rom its seaward end right to the back into the farthest end … there are systems of *lo'i* in Wainiha, some of them evidencing great ingenuity on the part of the planters who built them many centuries ago. The valley bottom and sides are rather irregular except at the seaward end. There were, of course, house sites all through the valley on ground not suitable for irrigation. On such land sweet potatoes were planted. Bananas flourished:

> in 1931 *maiʻa Polapola* (Borabora banana, *musa pehi*) was found in gulches. This Tahitian banana, which bears its fruit on an upright stalk, is said by local Hawaiians to be indigenous to Wainiha. *ʻawa* of several varieties was growing there also, and undoubtedly the economic staples *wauke* and *olonā* were planted. Specimens of yams were collected in 1931. [8:420]

Land use records tell an interesting story about the history of Wainiha Ahupuaʻa, but don't yield specific information about the survey area or the likelihood that historic properties might be found there.

Wainiha Ahupuaʻa was granted to Mikahela Kekauʻōnohi, an *aliʻi wahine*, during the Māhele. Kekauʻōnohi, a granddaughter of Kamehameha I, received more land in the Māhele than anyone other than the King [10:307]. She died in 1851, leaving her vast holdings to her husband, Levi Haʻalelea. Haʻalelea died in 1864 with a debt of about $40,000, which, adjusted for inflation, is the approximate equivalent of $565,000 in today's dollars. "In the probate of his estate and to pay off his creditors, the court auctioned a great deal of his ʻĀina at minimal prices" [10:307]. Wainiha Ahupuaʻa was purchased at auction by J. H. Morse, John de Fries and J. Halstead for $3,200 in 1866. Castle and Cooke purchased de Fries's undivided interest in Wainiha in 1871. Morse died sometime prior to May, 1877, leaving her share of Wainiha to Castle and Cooke in trust to sell or otherwise dispose of. In 1877, the Hui Kūʻai ʻAina o Wainiha, noted in land records as J. Leka et al., purchased Wainiha from Castle and Cooke.[1] Land records show that in the first two years after the Hui Kūʻai ʻAina o Wainiha was formed at least four shares were purchased by W. C. Jones, agent for Charles Kanaʻina, the father of King Lunalilo. In 1878, Jones, on behalf of Hui Kūʻai ʻAina o Wainiha, applied for and received Royal Patent 7194 for Wainiha Valley.

The story of the formation of the Hui Kūʻai ʻAina o Wainiha recorded in an article by John Lydgate in the Hawaiian Annual for 1913 is fanciful [12]. Lydgate grew up on Hawaiʻi Island, where he learned to speak Hawaiian, was educated at Oahu College (now Punahou School), and came to Kauaʻi in 1896 as a Congregational Church Minister. While at Oahu College he was taught surveying by W. D. Alexander and he carried out several survey jobs on Kauaʻi in addition to his duties with the Congregational Church. One of these survey jobs was the Wainiha Power Line, and it was perhaps during this work that he heard the story of how the Hui Kūʻai ʻAina o Wainiha formed.

According to Lydgate, the story begins when Kekauʻōnohi, a *male* chief, borrowed $10,000 from Aldrich & Co. for an ill-fated sandalwood venture in which the schooner *Manuokawai*, bound for Shanghai, disappeared without a trace. Kekauʻonohi's loan was "secured by a blanket mortgage covering all the lands of the Kekauonohi Estate" [12:127]. Kekauʻōnohi decided to sell the Wainiha lands because they produced little income and offered them to the native tenants for $9,000. Lydgate reports that Wainiha "master minds" Ki-ki-ko, La-haina, and Nuu-hiwa hatched a plan to have 90 families raise $100 a piece. There were three plans: (i) "[s]hip under the *haole* on the new sugar plantation at Hanalei for two years" and get a $100 advance; (ii) mortgage a *kuleana* to the same *haole* for $100 or more, then pay this off by entering into a contract to supply *poi* for the plantation at 1¢/lb.; (iii) give a note for $100 secured by the prospective value of the land and other possessions and "trust to a rise of values" to make good on the loan.

[1] Land records appear not to divulge what became of Halstead's interest in Wainiha.

Seventy-one members came to constitute the Hui Kūʻai ʻAina o Wainiha, which raised $7,100 toward the $9,000. The remaining $2,000 was transferred as debt to the Hui, at an annual interest rate of 15 percent. The Hui worked off the $2,000 and interest and proceeded to divide the land among the 71 members, each of whom received 5 ac. *mauka* and 5 ac. *makai*. The Hui subsequently was reported to have had difficulty paying taxes on the land and managing the shares, which "had been mortgaged and sold and given away and lost and variously split up, many times over in some cases" [13:96].

Although this story has been accepted as an account of actual events [e.g. 7], it appears to be almost wholly fabricated. Some of the inconsistencies are pointed out below.

- Mikahela Kekauʻōnohi was an *aliʻi wahine*, not an *aliʻi kāne*.
- Kekauʻōnohi had been dead for more than a quarter century when the Hui Kūʻai ʻAina o Wainiha was formed.
- The Hui Kūʻai ʻAina o Wainiha was formed in the late 1870s, a time that is much too late to be trading sandalwood. The industry collapsed in Hawaiʻi several decades earlier and the last sandalwood was shipped from Kauaʻi in the early 1840s [9:89–94].
- It is odd that the schooner *Manuokawai* would be headed to Shanghai because almost all of the Hawaiʻi sandalwood trade was to the ports of Hong Kong and Canton.
- The *Manuokawai* was not lost at sea prior to the establishment of the Hui Kūʻai ʻAina o Wainiha. This intercoastal schooner was well-known in the islands. In 1857, she was captained by John Paty to the Northwest Hawaiian Islands when these islands were annexed to the Kingdom, and later that decade she was used to search for guano in the central Pacific (*Polynesian* July 9, 1859). By the time the Hui Kūʻai ʻAina o Wainiha formed in the 1870s, the *Manuokawai* was used primarily for interisland service. She was picked up by the *James Makee* nine miles east of Anahola with her sails gone in December, 1883, having left Honolulu sometime earlier bound for Kohala, Hawaiʻi Island (*Pacific Commercial Advertiser*, December 18, 1883). Clearly, the ship had not disappeared with a cargo of sandalwood more than six years earlier.

Perhaps due to its reported troubles making tax payments, Hui Kūʻai ʻAina o Wainiha entered into an agreement with Kauai Electric Co. to harness the power of Wainiha Stream. "The object of the promoters in building an electric plant was to generate power from a mountain stream in Wainiha Valley on the northwest side of the Island of Kauai, and to utilize the same in operating pumps at McBryde Sugar Plantation on the south side of the island" [5:141]. The offer to the Hui Kūʻai ʻAina o Wainiha was $1,500 a year for 50 years for the lease of the water power, "together with a site for … [a] power-house and quarters, and rights of way for necessary ditches, roads, pole-lines, etc." [13:103]. The electric power plant was dedicated in August, 1905 [5:142].

In the years after development of the electric power plant, McBryde Sugar Co. actively bought shares in the Hui Kūʻai ʻAina o Wainiha. In doing so, it not only acquired valuable land assets, it also ensured that it would collect a portion of the lease rent it paid for the Wainiha water. When the Hui Kūʻai ʻAina o Wainiha was dissolved in 1947, following legal action by McBryde, at most only $6\frac{2}{3}$ shares were owned by descendants of original members; 48 shares were owned by McBryde, and two Robinson brothers owned $16\frac{1}{3}$

shares between them [7:14]. The shares at that time were worth about $5,000 [7:14], which represents a return of about $5\frac{3}{4}$ percent compounded annually.[2]

In 1947, McBryde Sugar Co., Ltd. purchased the shares that include the current parcel. The current owner is McBryde Sugar Co., Ltd.

1.4 Previous Archaeology

A review of reports from the SHPD library indicates that several archaeological studies have been carried out in the *ahupuaʻa* of Wainiha, though none in the location of the proposed fence line. Much of the archaeological work conducted in Wainiha has been inventory surveys which have reported a variety of habitations, agricultural sites, *heiau* and burials. Though, Wainiha Valley has not received considerable attention, in comparison to the coastal plain, especially in the remote location of the upper Wainiha valley. Only a small number of archaeological surveys have been conducted in the upper Wainiha Valley, though the lower Wainiha valley and coastal plains have been well surveyed.

Wendell Clark Bennett conducted an island-wide archaeological study on Kauaʻi in 1928–1929, recording many traditional Hawaiian sites [2]. The study recorded seven sites within Wainiha Ahupuaʻa, four of which are located on the inland portion of the valley, along the Wainiha stream, approximately 5.6–9.5 km downstream from the current project location.

These four sites include:

Site 153 House sites, on Mauna Hina ridge in Wainiha Valley. Remains of many old house sites and much irrigated land. The house sites are mostly of the terraced type and 10 to 15 feet wide.

Site 152 Taro terraces, about one mile above the Wainiha power house on the intake trail. This interesting taro section is high on the side of the valley utilizing a little stream and a small flat area. The hill is on one side and the stream and bluff on the other, leaving a fairly steep section in between. At one place above the terraces stones are built across the stream as an intake, which could, with the addition of a few more stones, shunt the water into a ditch which runs between large rocks and dirt walls. All along the edge of the stream is a wall built to keep the water from running back. The terraces are from 6 inches to 3 feet high.

Site 151 Apaukalea Heiau was located just inland of site 150, but only ruins remained when Bennett visited it. Apaukalea Heiau was highly disturbed by a modern habitation. Much of the site was destroyed by the construction of stone platforms, walks, graves with tombstones, and other stone work. The recent habitation hinders the identification of the *heiau*. Bennett describes the *heiau* as consisting of a small, square, paved area approximately 35 × 35 ft. The east wall is 15 ft. wide, and 3 ft. tall on the inside edge, with the outer wall tumbled. The north wall is

[2] This is well below the interest rate purportedly charged by Aldrich in the original loan to the Hui Kūʻai ʻAina o Wainiha, as reported by Lydgate [12].

irregular. The wall is about 15 ft. wide and 2 ft. high with a projection inward which forms a platform 10 × 15 ft. The west wall is dismantled but appears to have been 15 ft. wide. The south wall is approximately 3 ft. tall and varies in width. The wall spans a distance of 130 ft. from the road to the bluff. To the west of the *heiau* there is a flat space with two lines of stones traversing it, and on the east side of the *heiau* there are two paved house sites about 10 ft.[2]

Site 150 Laumaki Heiau The location is described as west of the "Power House" road and one mile from the government road in the Wainiha valley. Thrum describes Laumaki Heiau as "[a] small, open platform, paved *heiau*, 2 feet high, of the husbandry class." The platform of the *heiau* faces the ocean and measures 20 ft. wide and 10 ft. deep, and is paved with river stones. [2:135–136]

In 1978, Earle [3] conducted an archaeological study of irrigated taro cultivation in the Halele'a District. Earle describes Site 50–30–02–00453, formerly known as Site Ka-D6-11, as a series of six irrigated agriculture systems located alongside the Wainiha river, many of which were abandoned in the 1850s. Systems 11 and 12 are small, up-valley systems, located approximately 6 km downstream from the survey area, and are the farthest up-valley systems that Earle reported. System 13 is described as comprising approximately 3.7 ha of the interior of the lower Wainiha valley, located approximately 2 km from the coast. Systems 14, 15, 16, and 17 are downstream systems located on an alluvial flat, some which were used through the 1970s.

In 1982 and 1984, Barrera [1] conducted two archaeological surveys in the general vicinity, approximately 1.5 km downstream from the current survey area. Two traditional Hawaiian sites were located, Sites 50–30–02-01500 and 50–30–02-01501. Site 50–30–02-01500 is described as an agricultural system containing pond field terraces and dry terraces. The site is located on the alluvial terrace between the bottom of the steep valley slope and the bank of Wainiha Stream. The site measures about 55 × 245 m and is located at an elevation of 230–245 m above sea level. The site contains a well-constructed *'auwai* that diverted water from a side stream through the pond field system and emptied into the Wainiha Stream. The walls of the pond field system vary in height from 0.3–1.4 m. The individual pond fields measure approximately 8–465 m^2. The dry agriculture terraces located at the mouth of a small dry side stream consist of a series of crude stone reinforced embankments about 0.45 m in height. Site 50–30–02-01501, a lithic scatter, is located in an area of thick vegetation between two side streams. The scatter measures 15 × 60 m and consists of basalt waste flakes and chipping tools made from basalt dike-stones of the area.

In addition to reports in the SHPD library, Wainiha Valley has figured in regional archaeological research. Ladefoged et al. [11] modeled the distribution of traditional Hawaiian irrigated pondfields across the Hawaiian archipelago using a GIS approach based on climate, hydrology, topography, substrate age, and soil fertility. The predictions of the model were tested against the known distribution of agricultural remains in six locations, including the lower Wainiha Valley. In these six tests, the model performed very well, accurately predicting the locations of the archaeological remains. The predicted distribution of pondfield agriculture extends back into Wainiha Valley, but the small

scale of the map published by Ladefoged et al. [11] made it difficult to determine whether or not agricultural activities are predicted in the vicinity of the proposed fence line. At our request, Thegn Ladefoged of the University of Auckland graciously sent GIS data for Wainiha Valley, which allowed us to determine that the nearest location for which irrigated agriculture is predicted lies 1.3 km downstream from the proposed fence line.

2 Methods

Archaeologist Kekapala Dye spent one full day in the back of Wainiha Valley on August 4, 2009. Dye performed the survey by walking over the areas proposed for use and looking for evidence of human modification. In many places this was a difficult task. The vegetation is often thick, obscuring visibility, especially of the ground surface. Many trees felled by hurricane ʻIniki have not rotted and today present serious obstacles to hiking. Finally, the area is extremely wet and the ground was slippery and muddy in most places. Despite these difficulties, the fence lines were investigated with sufficient intensity to determine the presence or absence of traditional Hawaiian stone masonry.

3 Field Survey Results

The two sections of the proposed fence line were surveyed on foot and yielded no evidence for historic sites.

3.1 Southern Section

The proposed fence line on the southern slope of the valley extends approximately 370 m upslope from a relatively flat area that sits on a small cliff standing approximately 6 m above the Wainiha Stream. This flat area is the only area suitable for terracing, but no surface architecture was present. Due to its elevation above the stream this area would not be suitable for pond-field agriculture because of the difficulty of bringing stream water to it. From the stream side cliff the fence line runs up a steep and narrow ridge, where it stops just below a large rock outcrop, approximately half way up the north valley face.

3.2 Northern Section

The northern fence line also extends up the valley face from a ledge that rises about 6 m above the stream. The length of the proposed fence line here is approximately 125 m. The northern slope of the valley here contains much rock fall and the terrain, which is steep and slippery, is unsuited for agriculture or habitation. This fence line runs east below another small cliff for a short distance, to a nearly vertical incline, where it extends up to the base of a ridge outcrop.

4 Discussion and Conclusions

No historic properties were identified during the survey of the proposed fence line. Approximately 495 m of proposed fence line were surveyed.

An investigation of the land use history of Wainiha Ahupuaʻa, a review of previous archaeological research in the vicinity of the fence line, and a field check all failed to yield any evidence for historic properties. In addition, observations of topography and one long exposed stratigraphic section both indicate that subsurface historic properties are not likely to be found on the parcel. Thus, it is recommended that historic preservation review for this parcel be concluded with the determination that there are no historic properties present.

Though no historic properties were identified, Wainiha has a long history of agricultural development evidenced in both early surveys and modern archaeological survey. Vegetation was thick and limited the intensity of the survey. Thus, it is possible, but unlikely, that archaeological sites will be located during construction of the fence line. If this is the case, then the fence line should be routed to avoid them and an archaeologist contacted as appropriate.

Hawaiian Terms

ahupuaʻa Traditional Hawaiian land division, usually extending from the uplands to the sea.

aliʻi Chief, chiefess, officer, ruler, monarch, peer, head man, noble, aristocrat, king, queen, commander.

aliʻi kāne A male chief. See also *aliʻi*.

aliʻi wahine A female chief. See also *aliʻi*.

ʻauwai Ditch.

ʻawa A shrub, *Piper methysticum*, the root of which is the source of a narcotic drink of the same name used in ceremonies, prepared formerly by chewing, later by pounding.

haole White person, American, Englishman, Caucasian; American, English; formerly, any foreigner.

heiau Traditional Hawaiian place of worship.

kapa Tapa cloth, as made from *wauke* or *māmaki* bark.

kuleana Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.

loʻi A single irrigated taro patch; irrigated terrace, especially for taro.

maiʻa Polapola A banana, *Musa troglodytarum*, also known as *maiʻa heʻī* and *maiʻa feʻī*, recently introduced from Tahiti, where it was used as a starch crop, with similar taste to breadfruit. The black stems, which grow upright, were also used in weaving with hala, and a purple dye was made from the sap.

makai Seaward.

mauka Inland, upland, toward the mountain.

olonā A native shrub, *Touchardia latifolia*, whose bark was valued as the source of a strong, durable fiber for fishing nets, for nets to carry containers, and as a base for

ti-leaf raincoats and feather capes.

poi The Hawaiian staff of life, made from cooked taro corms, or rarely breadfruit, pounded and thinned with water.

wauke A small tree or shrub, *Broussonetia papyrifera*, whose bark was made into kapa cloth. The inner bark was used to make cordage, and the shoots were used to treat childhood diseases. The leaves, along with banana and taro leaves, were used ceremonially to wrap the bodies of aliʻi after death. See also *kapa*.

Abbreviations

SHPD The State Historic Preservation Division of the Hawaiʻi Department of Land and Natural Resources, a government agency responsible for implementing the National Historic Preservation Act of 1966, as amended, and Chapter 6E of the Hawaiʻi Revised Statutes.

TNC A conservation organization working around the world to protect ecologically important lands and waters for nature and people.

Bibliography

1. Barrera, Jr., W. (1984, November). *Wainiha Valley, Kauai: Archaeological Studies*. Prepared for Orion Engineering. Honolulu: Chiniago Enterprises.

2. Bennett, W. C. (1931). *Archaeology of Kauai*. Number 80 in B. P. Bishop Museum Bulletin. Honolulu: Bishop Museum Press.

3. Earle, T. (1978). *Economic and Social Organization of a Complex Chiefdom: The Halelea District, Kauaʻi, Hawaii*. Number 63 in Anthropological Papers. Ann Arbor, MI: Museum of Anthropology, University of Michigan.

4. Foote, D. E., E. L. Hill, S. Nakamura, and F. Stephens (1972). *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. Washington, DC: U.S. Department of Agriculture, Soil Conservation Service in cooperation with the University of Hawaii Agricultural Experiment Station.

5. Gartley, A. (1907). The Wainiha electric power plant. *Hawaiian Almanac and Annual for 1908*, 141–156.

6. Giambelluca, T. W. and T. A. Schroeder (1998). Climate. In S. P. Juvik and J. O. Juvik (Eds.), *Atlas of Hawaiʻi* (Third ed.)., pp. 49–59. Honolulu: University of Hawaii Press.

7. Hammatt, H. H. and G. Ida (1995). *Archaeological Investigation of Land Proposed for Acquisition by County of Kauaʻi at Wainiha, Kauaʻi (TMK: 5–8–02:Por. 3)*. Prepared for Portugal and Associates. Kailua, HI: Cultural Surveys Hawaii.

8. Handy, E. S. C. and E. G. Handy (1972). *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Number 233 in B. P. Bishop Museum Bulletin. Honolulu: Bishop Museum Press. With the collaboration of Mary Kawena Pukui.

9. Joesting, E. (1987). *Kauai:The Separate Kingdom*. Honolulu: University of Hawaii Press and Kauai Museum Association.

10. Kameʻeleihiwa, L. (1992). *Native Land and Foreign Desires*. Honolulu: Bishop Museum Press.

11. Ladefoged, T. N., P. V. Kirch, S. M. Gon III, O. A. Chadwick, A. S. Hartshorn, and P. M. Vitousek (2009). Opportunities and constraints for intensive agriculture in the hawaiian archipelago prior to european contact. *Journal of Archaeological Science 36*, 2374–2383.

12. Lydgate, R. J. M. (1913). The Affair of the Wainiha Hui. *Hawaiian Almanac and Annual*, 125–137.

13. Thrum, T. G. (1923). Securing the Wainiha water-right lease. *Hawaiian Almanac and Annual for 1924*, 95–112.

FLORISTIC SURVEY ALONG PROPOSED STRATEGIC FENCE LINE WAINIHA PRESERVE, KAUA`I, HAWAI`I

Biological report prepared for The Nature Conservancy and the Kaua`i Watershed Alliance
November 2009

KENNETH R. WOOD
NATIONAL TROPICAL BOTANICAL GARDEN
3530 PAPALINA RD, KALAHEO, KAUA`I, HAWAI`I 96741 kwood@ntbg.org

PROPOSED STRATEGIC FENCE FOR WAINIHA

On 12–13 April 2009 the author assisted The Nature Conservancy, Coordinator for the Kaua`i Watershed Alliance, in a botanical survey along a potential strategic fence line. This fence line is located at approximately 365 m (1200 ft) elevation (see Map 1) and was designed to protect approximately 5,750 acres of prime watershed around the upper Wainiha Stream and forest region from the destructive presence of non-native feral ungulates, particularly pigs. NO RARE PLANT TAXA were observed on this proposed fence line.

The proposed strategic fence line is approximately 600 m (ca. 1970 ft) long and well placed. The plant community that it passes through is a *Metrosideros polymorpha* lowland wet forest with a 30–50% cover. The riparian sections of the fence line are relatively level or with moderate slopes and are dominated by non-native understory trees of *Psidium guajava* and *Aleurites moluccana.* This non-native portion is interspersed with common native tree components such as *Pisonia umbellifera, Antidesma platyphyllum* var. *hillebrandii, Ilex anomala, Psychotria mariniana,* and *Kadua affinis*. Moving further from the stream toward the upper valley walls, the proposed fence line rises up through very steep open slopes dominated by native matting ferns such as *Dicranopteris linearis* & *Diplopterygium pinnatum* with occasional *Metrosideros* forest patches which are associated with understory ferns of *Microlepia strigosa* & *Sphenomeris chinensis*.

Map 1. Proposed Strategic Fence line designed to prevent incursion of non-native ungulates from entering prime watershed of Wainiha (Note: upper headwaters, lower right).

RECOMMENDATIONS CONCERNING THE PROPOSED WAINIHA FENCE LINE

The biologically rich watershed of Wainiha, Kaua`i is threatened by the destructive presence of habitat-modifying non-native plants and feral ungulates, especially pigs which threaten the health and integrity of the Wainiha watershed. It is recommended that this strategic fence be constructed to stop the ingress of additional pigs, in concert with the on-going removal of pigs that are currently degrading this biologically unique Preserve (see Floristic Summary below).

In order to avoid negative impacts on native taxa along the proposed fence line the following recommendations are suggested:

- clean all equipment and fence material before being transported to the Preserve (e.g., pressure washing and follow-up with tenting/fumigation protocols),
- once the strategic fence is installed, walk the fence-line 2–3 times a year in order to observe and address any changes in erosion; presence of invasive weeds; non-native vertebrates and invertebrates; and to repair any damaged fence line (e.g., fallen trees, deterioration from elements, vandalism).

FLORISTIC SUMMARY OF WAINIHA PRESERVE. The flora of the Wainiha Preserve is estimated to be composed of some 281 taxa of vascular plants from 75 families. This includes 222 native taxa, 51 non-native naturalized species, and 8 Polynesian introductions. Of the 222 native plant species naturally occurring within the Wainiha Preserve region, I find that 177 are endemic and 45 are considered indigenous. Of those native taxa, 121 are dicotyledons, 24 are monocotyledons, and the remaining 77 are native pteridophytes. In addition, the Wainiha Preserve is prime habitat for 63 Kaua`i single island endemic (SIE) taxa (see Table 1) which is 28% of the entire 225 SIE taxa unique to Kaua`i. This high level of endemism clearly demonstrates the floristic uniqueness, diversity, and importance of the region (Wood 2009).

TABLE 1

Notes on the Flora of Wainiha Preserve

CATEGORY	# OF TAXA
# of plant taxa in Preserve (Total)	281
# of native endemic	177
# of native indigenous	45
# of non-native taxa	51
# of Polynesian introductions	8
# of native dicots	121
# of native monocots	24

CATEGORY	# OF TAXA
# of native pteridophytes	77
# of endemic genera	18
# of taxa representing endemic genera	40
# of single island endemics (SIE)	63

Wood (2007) describes the upper drainages and forested slopes of Wainiha as being dominated by a native tree canopy of *Metrosideros polymorpha* var. *glaberrima* (‘ōhi‘a), which average around 12 m (40 ft) in height. Occasionally in the less steep regions, *Syzygium sandwicensis* (‘ōhi‘a hā) becomes the dominant along with *Antidesma platyphyllum* (hame). Some open sections along the forested banks of streams can also be dominated by *Aleurites moluccana* (kukui) and interspersed with *Pisonia umbellifera* (pāpala kēpau). Common understory trees include *Psychotria mariniana & P. hexandra* (kōpiko), *Scaevola procera* (naupaka kuahiwi), *Kadua affinis* (manono), *Dubautia knudsenii* (na‘ena‘e), *Broussaisia arguta* (kanawao), and several species of *Myrsine* (kōlea). Along streams a predominance of Urticaceae occur, including *Boehmeria grandis* (‘ākōlea), several species of *Pipturus* (māmaki), and the monotypic genus *Touchardia* (olonā). Additional less common associate trees include *Ilex anomala* (kāwa‘u), along with several species of *Cheirodendron* (‘ōlapa), *Cyanea* (hāhā), *Melicope* (alani) and *Labordia* (kāmakahala). Understory riparian herbs and shrubs include many representatives of *Cyrtandra* (ha‘iwale) and *Peperomia* (‘ala‘ala wai nui). Common terrestrial sedges throughout this region include species of *Machaerina* (‘uki or ‘ahaniu) along with several species of vigorous sedges within the genus *Gahnia*.

The composition of understory riparian ferns in Wainiha are similar to several of the adjacent north Kaua`i wet valleys and include the dominant *Diplazium sandwichianum* (hō‘i‘o), along with *Christella cyatheoides* (kikawaiō), and several species of *Asplenium, Sadleria* (‘ama‘u), and *Cibotium* (hāpu‘u). In many areas, especially along the steeper drainage walls, the upper stream banks and ridges become dominated by the indigenous matting ferns *Dicranopteris linearis* (uluhe) and *Diplopterygium pinnatum* (uluhe lau nui). Occasionally one can observe the endemic

matting fern, *Sticherus owhyhensis* (uluhe or unuhe), along the banks of streams. Epiphytic and lithophytic Hymenophyllaceae and Grammitidaceae are common in the forest understory and include several species of *Adenophorus* (wahine noho mauna). These delicately beautiful ferns are often matting the trunks of trees and are associated with epiphytic mosses. *Adenophorus*, along with tree-fern species of *Sadleria* represent distinct genera restricted to the Hawaiian Islands (Wood 2006a). It should be noted that the back of Wainiha valley has a significant population of *Microsorum spectrum* var. *pentadactylum* (peʻahi or lauaʻi), a maile-scented fern used traditionally for hula (Wood 2007).

MAJOR THREATS TO THE PRESERVE

Until the Preserve is fenced, non-native feral mammals, especially pigs (*Sus scrofa*), will remain a serious threat to the ecological integrity of the watershed. The author has witnessed many remote regions completely transformed from pristine native ecosystems to degraded, secondary alien vegetation by invasive mammals. This damage can occur in a short span of years and is often difficult and expensive to correct, if not impossible (Wood 2007). Rats are quite obvious throughout the Preserve and debris piles of rat-chewed native seed are often observed. Black rats (*Rattus rattus*) are especially dangerous predators to native forest birds and seabirds. Much research has been directed toward their eradication in recent years. Barn owls (*Tyro alba*) are also serious predators of seabirds, and several have been observed ranging along the upper Wainiha drainage. Species of introduced slugs are also regularly seen on native Campanulaceae and are especially destructive to species of *Cyanea*.

Clidemia hirta (Koster's curse) is a very prolific shrub that now threatens the Wainiha region of the Preserve. Native to tropical America, *Clidemia* was first reported on Oahu in 1941 and had spread through much of the Koolau Mountains by the early 1960's. It now threatens five of Hawai`i's main islands including Kaua`i (Cuddihy and Stone 1990). This shrub thickly covers and displaces native plants and is beginning to invade many of the Kauai's northern valleys. Efforts should be made to investigate and introduce bio-controls for this and other invasive species in the Preserve. Another noteworthy threat to the Preserve includes the large Australian tree fern, *Sphaeropteris cooperi*. This vigorous tree fern has started to become established

throughout the entire island of Kaua`i. Biologists will need to incorporate some innovative controls to keep their densities down. *Hedychium gardnerianum* (kāhili ginger) will also be a challenge as it known to cover large sections of bottom-land and can quickly establish itself in disturbed sites and landslide regions. The author considers *Buddleia asiatica* (huelo ʻīlio or dog tail) to be another one of the most serious of invasive shrubs that can quickly overtake riparian ecosystems of Hawaiʻi. Previously recorded on the islands of Oʻahu, Molokaʻi, Maui, and Hawaiʻi, it was only recently reported on Kaua`i (i.e., 2004) where it was first documented around the very back of Wainiha Valley below Hinalele falls (Wood 2006b; Wood 2007). Over the last five years *B. asiatica* has spread quite vigorously and is apparently displacing habitat for native species of Urticaceae, including *Pipturus, Boehmeria, Urera,* and *Touchardia* species. Another very serious and noteworthy threat which is slowly working its way up the Wainiha river to the upper Preserve region is *Psidium* guajava (common guava).

Erigeron karvinskianus (daisy fleabane) can be seen smothering sections of drainage within the upper Wainiha Valley. This herbaceous plant is notorious for cascading down steep regions and blanketing over the original native flora. Both *Rubus argutus* (blackberry) and *Rubus rosifolius* (thimbleberry) are also becoming established within the Preserve (Wood 2007).

Aleurites moluccana (Kukui) is a non-native Polynesian introduction that is a dominant component of forests along stream banks throughout the Preserve, but especially in the lower reaches.

Weedy grasses and sedges are occasional within the Wainiha region, including *Andropogon glomeratus* (beardgrass), *A. virginicus* (broomsedge), *Axonopus fissifolius* (narrow-leaved carpetgrass), *Cyperus meyenianus, Juncus planifolius* (bog rush), *Oplismenus hirtellus* (basketgrass), *Paspalum conjugatum* (Hilo grass), *Sacciolepis indica* (Glenwood grass), *Schizachyrium condensatum* (beardgrass), and *Setaria gracilis* (yellow foxtail). Several large species of beardgrass or bluestem, including *Schizachyrium and Andropogon*, can be aggressive pioneer species wherever landslides and animal disturbance is excessive (Wood 2007).

Other noteworthy invasive non-native shrubs and ferns include *Lantana camara* (lākana), *Zingiber zerumbet* (‘awapuhi), *Pluchea carolinensis* (sourbush), *Nephrolepis multiflora* (swordfern), *Blechnum appendiculatum*, *Deparia petersenii*, *Christella dentata* (pai‘i‘ihā), and *Adiantum raddianum* (maidenhair fern).

For those interested in further details on the floristic diversity of Wainiha, Wood (2009) summarized the presence of rare plant taxa found within the Wainiha Preserve (above the proposed fence line) including: a) distribution and abundance maps; b) vascular plant species checklists; and c) an appendix of herbarium collections made within the study region.

LITERATURE CITED

CUDDIHY, L. W., AND C. P. STONE. 1990. Alteration of native Hawaiian vegetation: Effects of humans, their activities and introductions. University of Hawaii Press, Honolulu, 138 pp.
Degener, O. 1946. Flora Hawaiiensis.

MABBERLEY, D. J. 2008. Plant-book. A Portable Dictionary of Plants, their Classifications, and Uses. 3rd Edition. Cambridge University Press.

PALMER, D. D. 2003. Hawai`i’s Ferns and Fern Allies. University of Hawai`i Press, Honolulu.

SAKAI, A. K., W. L. WAGNER, D. M. FERGUSON & D. R. HERBST. 1995. Origins of Dioecy in the Hawaiian Flora, *Ecology*, **76**(8), pp. 2517–2529.

WOOD, K. R. & STEVE PERLMAN, 1993. Rare & Endangered Flora of Wainiha. Prepared for Sierra Club Legal Defense Fund under Pew Charitable Trusts Biodiversity Grant, *National Tropical Botanical Garden Technical Report*. 30 pp.

WOOD, K. R. 2006a. Summary Report of Research, Limahuli Valley, Kaua`i, Hawai`i. Biological report prepared for National Tropical Botanical Garden managing staff. 76 pp.

WOOD, K. R. 2006B. New Plant Records and Rediscoveries within the Hawaiian Islands, in *Records of the Hawaii Biological Survey for 2004–2005.* Part 2: Notes, Edited by Neal L. Evenhuis & Lucius G. Eldredge. *Bishop Museum Occasional Papers* **88:** 15–19.

WOOD, K. R. 2007. Notes on the Flora of Wainiha and Alaka`i, Kaua`i, Hawai`i, Biological report prepared for The Nature Conservancy and the Kaua`i Watershed Alliance. 60 pp.

WOOD, K. R. 2009. Further Notes on the Flora of Wainiha, Kaua`i, Hawai`i, with comments on proposed strategic fence, Biological report prepared for The Nature Conservancy and the Kaua`i Watershed Alliance. 141 pp.

WAGNER, W. L., HERBST, D. R., and S. H. SOHMER. 1999. *Manual of the flowering plants of Hawai`i, revised edition*, with supplement by Wagner, W. L. and D. R. Herbst, pp. 1855–1918. University of Hawaii Press, 1919 pp. in 2 volumes. (Bishop Museum Special Publication 97).

Preliminary Results: KESRP Auditory Surveys Wainiha Valley

1 – 4 September 2008

Nick Holmes: nick.holmes@hawaii.edu

The following report is a preliminary effort to communicate aims, methods and key results from a recent survey effort to search for Newell's shearwater (*Puffinus newelli*) and Hawaiian petrel (*Pterodroma sandwichensis*) breeding activity in the Wainiha Valley. A more complete report is due following completion of 2008 fieldwork.

Newell's shearwater (NESH) and Hawaiian petrel (HAPE) are endemic to the main Hawaiian Islands and listed as threatened and endangered under the US FWS ESA, respectively. Both are forest nesting pelagic seabirds, returning to Hawaii between April and November to breed, and remaining at sea for the remainder of the year. Knowledge of their breeding distribution is patchy due to remote nesting areas and cryptic breeding behavior. Efforts are underway to locate breeding sites, with particular emphasis on those where practical conservation efforts can be undertaken.

Survey aims:

1. Identify the presence / absence of Newell's shearwater and Hawaiian petrels, including direct evidence of breeding (burrows, birds seen taking off, ground calling) and indirect evidence of likely breeding (calling & flight activity 'hotspots'). Describe breeding habitat where found.
2. Describe potential threats to these endangered burrowing seabirds, including predators (Barn owls, cats, pigs, rats) and other habitat modification, including goats and invasive vegetation species.

Survey Methods:

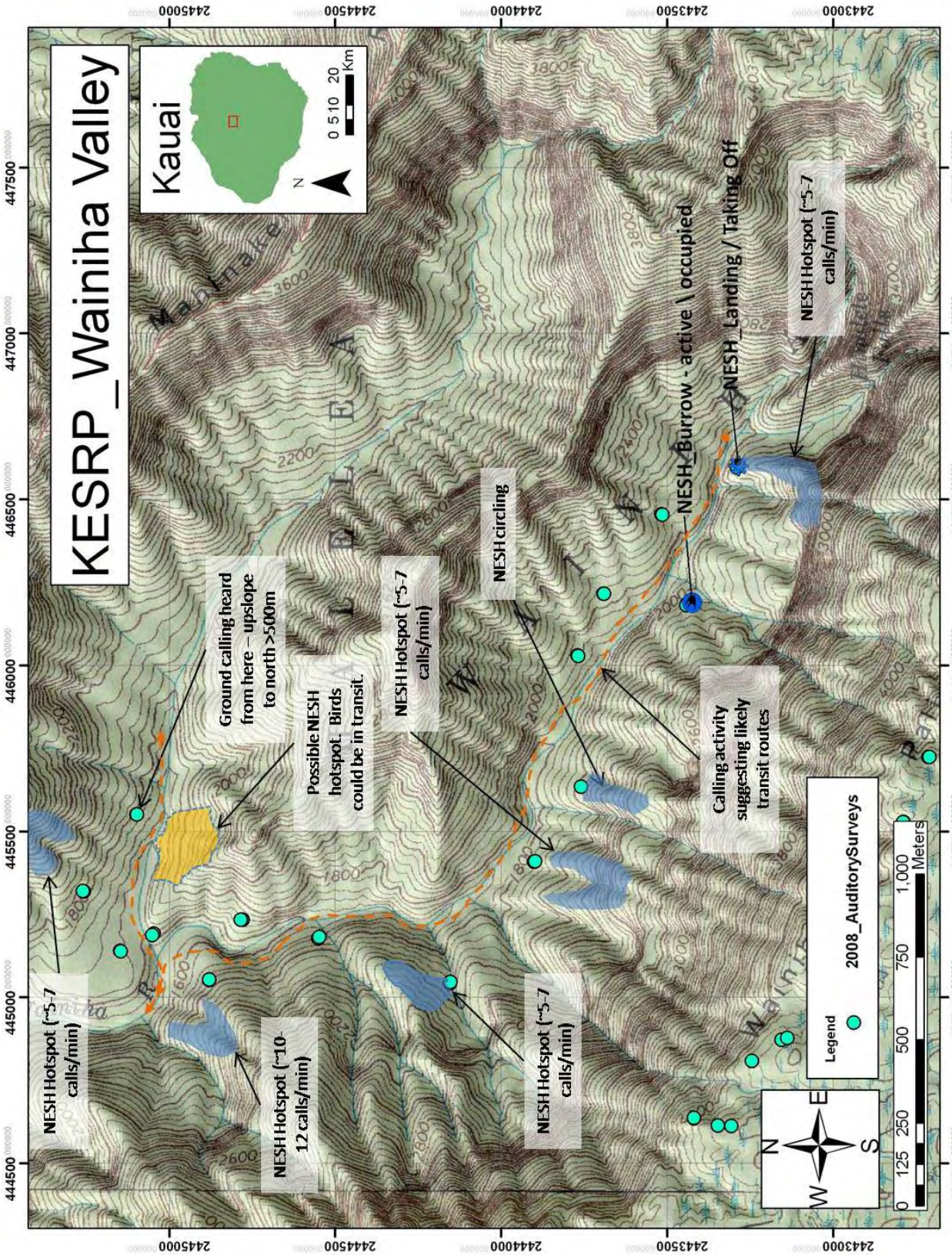
1. Auditory surveys were undertaken from 0 – 120 min after sunset and 120 – 30 min before sunrise, coinciding with arrival and departure times of NESH and HAPE to breeding sites, and when calling rates are highest. HAPE detections are typically only recorded during evening surveys. Calling activity is primarily undertaken by non-breeding birds (2-6 year olds learning to

breed) who visit the colony between July – September. Breeding birds tend to only call when both partners are present at the nest (one night every 7-10 days).

2. Under good conditions (little wind, no rain, no topographic barriers), NESH can be heard up to a kilometer away, HAPE less than 500 m. Vocalizations also appear to be influenced by available moonlight, with calling activity decreasing with increasing surface moon visibility. The Wainiha river was a major limitation to these survey efforts.
3. Habitat assessments and descriptions of threats are made opportunistically throughout the surveys, typically when in transit between survey sites.

Key results:

1. Over four days, a total of 15 auditory surveys were undertaken in the morning and 15 in the evening, with five staff. Fewer calls were recorded in the evening surveys, consistent with the reduction in non-breeding (calling) NESH expected at this time of year. No HAPE breeding areas were detected but note that breeding is suspected in this region at higher elevation (beyond auditory range of these surveys). Background noise from the river reduced likely hearing distance of all surveys.
2. During morning surveys, 6 calling and flight activity hotspots were recorded, and are likely indicators of breeding at these sites (see map). In addition, other evidence of breeding was recorded, including an active breeding burrow, multiple incidences of birds circling an area, and birds observed landing on the ground.
3. Birds were heard transiting in the southern drainage, with the highest numbers recorded at the confluence of the northern and southern drainages. Although only one survey was undertaken in the northern drainage, calling recorded birds are likely to be breeding there too.
4. Newell's shearwaters appear to be breeding in low densities along the north facing slopes of the southern drainage of the Wainiha Valley. Habitat in these regions appear to be relatively intact native forest, including vegetation structure typical of other known NESH breeding sites (15-25% tree canopy: *Metrosideros, Cheirodendron*; with a dominant shrub layer of *Dicranopteris*).
5. Threats to birds include a) pigs as potential habitat modifiers, b) barn owls, and c) invasive plants known to modify vegetation structure including *Psidium cattleianum*. Cats and rats were not detected but are likely to be present in this region. Large landslips were also dominant features on steep slopes in this region, and may also be a threat to breeding sites.


KESRP_Wainiha Valley
Kauai
N
0 5 10 20 Km
Ground calling heard from here – upslope to north >500m
Possible NESH hotspot. Birds could be in transit.
NESH Hotspot (~5-7 calls/min)
NESH circling
NESH_Burrow - active \ occupied
NESH_Landing / Taking Off
NESH Hotspot (~5-7 calls/min)
Calling activity suggesting likely transit routes
NESH Hotspot (~5-7 calls/min)
NESH Hotspot (~10-12 calls/min)
NESH Hotspot (~5-7 calls/min)
Legend
2008_AuditorySurveys
0 125 250 500 750 1,000 Meters
N
E
S
W
444500
445000
445500
446000
446500
447000
447500
2443000
2443500
2444000
2444500
2445000

Cultural Impact Assessment

for the

WAINIHA PROTECTIVE FENCE PROJECT

Hinalele Falls and Wainiha Stream at the head of Wainiha Valley, Hanalei District, Kaua'i

Cultural Impact Assessment

for the

WAINIHA PROTECTIVE FENCE PROJECT

An Assessment of Impacts on Cultural Sites and Practices
at Wainiha Preserve, Hanalei District, Kaua‘i

Prepared by
Samuel M. Gon III, Ph.D.
Senior Scientist and Cultural Advisor
The Nature Conservancy of Hawai‘i
923 Nu‘uanu Avenue
Honolulu, HI 96817

Prepared as a
supporting document for the
Environmental Assessment for the
Proposed Upper Wainiha Valley Fence

OCTOBER 2009

Executive Summary

A review of pertinent literature and records, extracts from recently conducted interviews with regional cultural practitioners and elders, and previous investigations by the State Historic Preservation Division (SHPD), and contracted archeologists on sites, features and practices of cultural significance at the proposed fence route in the Wainiha Preserve, Wainiha Ahupuaʻa, Hanalei District, Island of Kauaʻi, reveals that there are no archeological sites within the proposed area, and that only lands several kilometers *ma kai* (seaward) of the site include significant sites. This corroborates the described geography of historical activities in the region, concentrated in arable valley bottoms and lower elevations near the coast, and minimal above Lāʻau Ridge. The lands of the proposed fence area bear significance as the *wao nahele* (forested zone) containing native plants and animals of great cultural value, and as *wahi pana* (storied places) tied to the *Mū-ʻai-maiʻa* (the banana-eating Mū people) and the *menehune*. Persistence of *maiʻa* (banana) growing in the remotest parts of upper Wainiha is traditionally pointed to as evidence of past habitation of the *Mū*. Otherwise, the upper valley retains very strong native vegetation, but with the start of significant invasion by alien plants and animals. The proposed conservation actions (fencing and ungulate control), designed to protect the native forest and the native species that reside within it, will enhance the cultural value of the lands and will exercise care to retain traditional access, such as to gather native plant material for hula and other Hawaiian arts.

Cultural Impact Assessment
for the
WAINIHA PROTEC TIVE FENCE PROJECT

CONTENTS

EXECUTIVE SUMMARY III

INTRODUCTION 1
METHODS: 1
A. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT 3
Location *3*
Hawaiian Cosmogonic background *4*
Place Names *5*
Winds & rains *6*
B. HISTORICAL/ARCHAEOLOGICAL AND CULTURAL SITES 8
No archeological sites reported *8*
Consultations *8*
Archeological investigation *9*
C. CULTURAL AND TRADITIONAL PRACTICES 10
Little reference to traditional practices *10*
Agriculture concentrated in lowlands *10*
Cultural practices mentioned in interviews *10*
D. CULTURAL IMPACTS AND BENEFITS OF THE PROPOSED ACTIONS 11
Alien species control benefits archeological sites *11*
Fencing *11*
Hawaiian gathering rights *11*
E. SUMMARY DESCRIPTION OF THE ACTION'S EFFECT ON CULTURAL SITES AND PRACTICES 13
F. MITIGATION OF CULTURAL IMPACTS 13
SOURCES 14

Cultural Impact Assessment
for the
WAINIHA PROTECTIVE FENCE PROJECT

An Assessment of Impacts on Cultural Sites and Practices at Wainiha Valley, Hanalei District, Kaua‘i

Introduction

This report meets the requirements and standards of state environmental law, as delineated in Section 343-2 of the Hawai‘i Revised Statutes. This includes the Office of Environmental Quality Control’s (OEQC) requirement for environmental impact statements to consider effects on cultural resources or cultural practices. The Nature Conservancy of Hawai‘i is submitting this concise cultural impact assessment to identify and address the effects of its on-going land management actions on native Hawaiian cultural sites and practices in the remote portions of the Wainiha Preserve. These management actions are detailed in the *Kaua‘i Watershed Management Plan* (KWA 2005).

Methods:

Cultural Impact Assessments (CIA) are a recent additional requirement of the EA process, focusing on both documented and potential impacts of proposed actions on cultural sites and traditional practices exercised at a place by the communities associated with a place.

In ascertaining the potential impacts of its land management activities on cultural sites and practices, the Conservancy consults regularly with appropriate authorities, reviews published and unpublished literature. It also takes advantage of its cultural expertise on staff, which includes Dr. Sam ‘Ohukani‘ōhi‘a Gon III (a cultural practitioner and researcher, now serving as Senior Scientist and Cultural Advisor of The Conservancy).

Extensive prior background research for Wainiha has been conducted, including the entire period of human occupation in the area from traditional Hawaiian times through the Twentieth Century (Maly & Maly 2003). The major task of the background research was a literature review which included a review of Native Hawaiian historical accounts, legends, and traditions, Māhele documents, previous oral history projects, and previous archaeological studies. Research also included examination of the maps, historical photos, and other documents on file at the Hawai‘i State Archives, the Bernice P. Bishop Museum, the State Historic Preservation Division, the State Survey Office, and the Hamilton Graduate Library at the University of Hawai‘i at Mānoa.

Hawaiian language newspapers electronically rendered in the digital on-line resource Ulukau.org (Hale Kuamo‘o & Alu Like 2009), were searched for relevant entries based on the place names associated with the Wainiha Preserve in the vicinity of the fence project, such as Wainiha, Lā‘au, Kamaha, Hinalele, and spelling variants for these places, bearing in mind that newspapers of the time did not typically include diacritical marks. Only pertinent data describing the upland portions of these lands were considered in the impact assessment. It is noted later that the vast majority of discussions on Wainiha is associated with the coastal section and arable lands

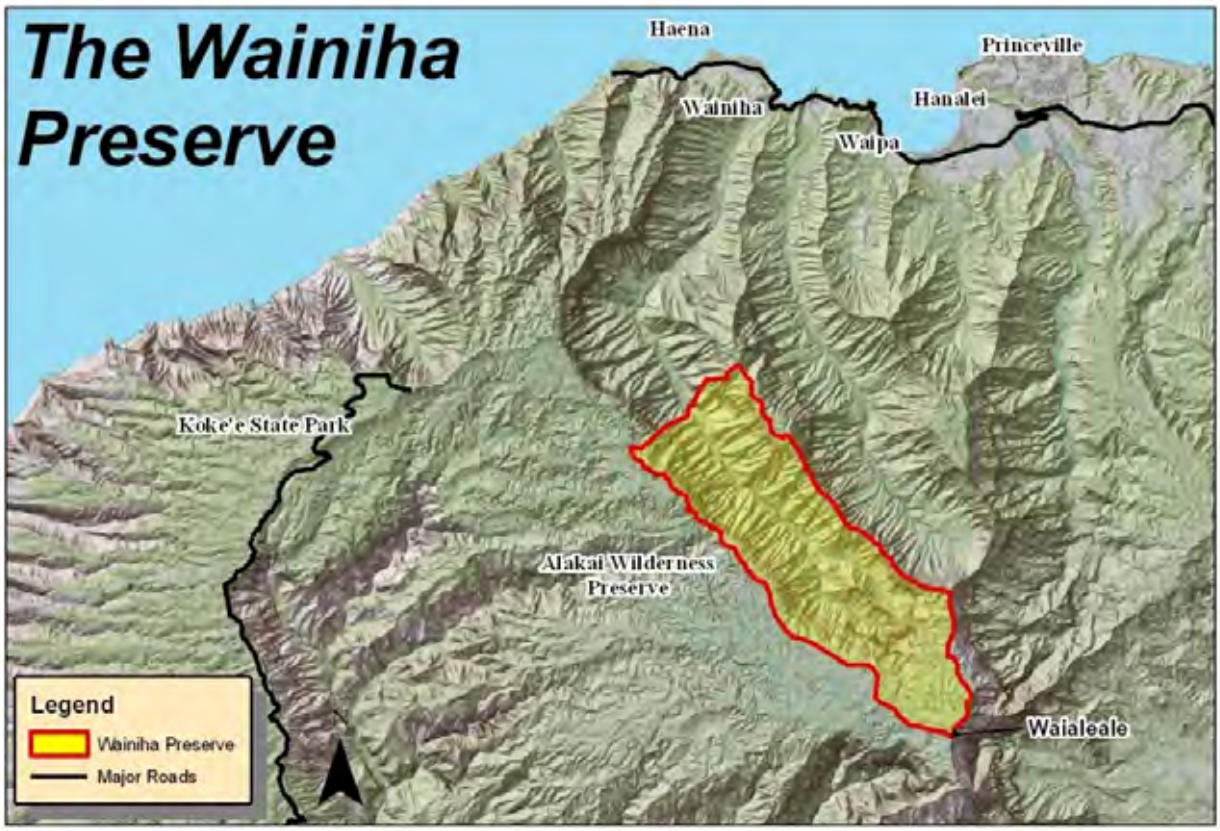
extending a few miles inland, well below the proposed fence area. Activities clearly referring to the coastal and lowland portions of Wainiha were not included in the assessment of history and impacts.

As a coordinator for the Kaua‘i Watershed Alliance (KWA), the Conservancy has submitted in 2007 and 2009, Environmental Assessments (EA) for fence projects at Kanaele Bog (OEQC 2007) and in the Alaka‘i Plateau areas (OEQC 2009). Both projects received a "Finding of No Significant Impact" (FONSI) and consequently, these projects were officially allowed to proceed. Because the EA for the Wainiha Fence Project is of similar nature to these other wilderness fencing projects, the expectation is that a FONSI will be the result of this current assessment.

A. Summary Description of the Affected Environment

Location

The 7,050-acre Wainiha Preserve (below) lies within the upper reaches of the traditional Hawaiian ahupuaʻa (land division) of Wainiha.



Map created on July 25, 2008 by Nicolai Barca of The Nature Conservancy

The western edge of the ahupuaʻa makes up part of the boundary of the moku (districts) of Hanalei and Waimea, from Mauna Hina and the edge of the Wainiha Pali into the Alakaʻi Plateau to the summit of Waiʻaleʻale. The proposed project area lies entirely within Hanalei District and Wainiha Ahupuaʻa. The furthest mauka (inland) extent of the Wainiha Preserve lies in the Alakaʻi Plateau at the juncture of four of the five moku of the Island of Kauaʻi: Hanalei, Kawaihau, Līhuʻe, and Waimea. Various revisions in the districting boundaries (e.g., via the Māhele of 1848, Civil Code of 1859, Session Laws of 1909, and its 1932 revision) have not substantially altered the traditional context of Wainiha Preserve (see Bier 2004).

Wainiha Preserve [Owner: McBryde Sugar Co., Ltd. (A & B Hawaiʻi Inc.), TMK: 4-5-8-001-001; LU Classification: Conservation, Subzone P1 (Restricted)] lies wholly within and occupies a northern portion of the Kauaʻi Watershed Alliance, and the proposed fence occupies the most remote portion of the Preserve (see Fig. 2 below).

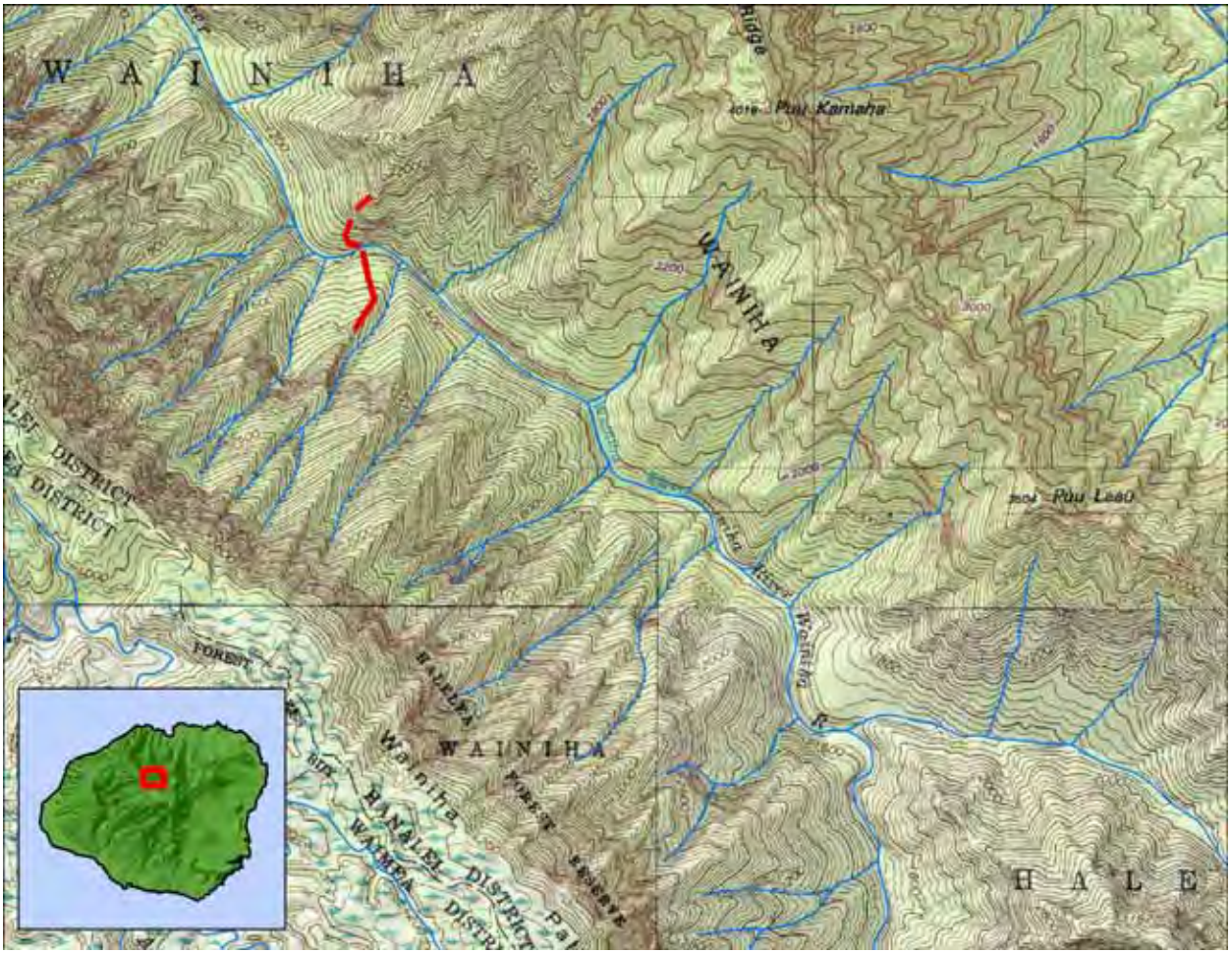


Figure 2. The proposed fence project (red) is situated in a remote portion of Wainiha Preserve.

Hawaiian Cosmogonic background

The Hawaiian cosmogony views the islands of the archipelago as born of Papa and Wākea, primal ancestral parents. Wākea, sky-father inseminates Papa, earth-mother, and islands are born of the union. The island of Kaua‘i is among the last of the island-children born of Papa (Papa-hānau-moku, or Papa-birthing-islands). One traditional creation chant (see Fornander 1917) gives it thus:

‘O Wākea noho iā Papahānaumoku
Hānau ‘o Hawai‘i, he moku; Hānau ‘o Maui, he moku
Ho‘i hou o Wākea, noho iā Ho‘ohokukalani
Hānau ‘o Moloka‘i, he moku; Hānau ‘o Lāna‘i, ka ‘ula, he moku
Līlī‘ōpū punalua ‘o Papa iā Ho‘ohokukalani
Ho‘i hou o Papa, noho iā Wākea
Hānau ‘o O‘ahu he moku; Hanau ‘o Kaua‘i he moku
Hanau o Ni‘ihau, he moku; He ‘ula o Kaho‘olawe

(translation next page)

Wākea lived with Papahānaumoku
Hawaiʻi was born, an island; Maui was born, an island
Wākea returned, lived with Hoʻohokukalani
Molokaʻi was born, an island; Lānaʻi was born, red, an island
Jealous of the second wife Hoʻohokukalani was Papa
Papa returned, resided with Wākea
Born was Oʻahu an island; Born was Kauaʻi, an island
Born was Niʻihau, an island; An afterbirth is Kahoʻolawe

The cultural consequence of this tradition is that the island of Kauaʻi lies upon the genealogical line from the gods forward, tying all Hawaiians to the islands. The general connection of kānaka (people) to the ʻāina (land) stems from this cosmogonic tradition.

Place Names

The cultural significance of places, whether they bear archeological sites or not, is often reflected in their names, which may reflect natural features, natural resources, historical events and figures, or other aspects of the history or cultural uses of an area. Although not exhaustive, the following place names are associated with Wainiha Preserve in the vicinity of the proposed fencing project. Pukui et al (1974) provides some interpretation:

> Wainiha – The name of the ahupuaʻa, valley, stream, and pali (cliff) system. *Lit*., "unfriendly water."
>
> Lāʻau – ridge and puʻu (hill) along the east boundary of Wainiha. *Lit*., "wood," possibly referring to the forested nature of the landscape.
>
> Hinalele – waterfall (280 feet drop), near the head of Wainiha Valley. *Lit.*, Hina's leap.
>
> Kamaha – hill (4,016 ft), along the ridge separating Wainiha from Lumahaʻi. No translation offered in Pukui et al 1974.
>
> Mahinakēhau – ridge (ca 4000 ft) separating upper Wainiha from Lumahaʻi valley. Not listed in Pukui et al 1974, but prominent on USGS maps of Wainiha, and translated in Pukui & Elbert (1971) as "a variety of sweet potato."

It is instructive that these are the only place names listed for Wainiha valley above about 1000 ft elevation. Below this elevation there are many more names for prominent ridges, waterfalls, lookouts, and other topographic features, such as Kulanaililia, Puʻu Iliahi, Pōhakuokāne, Makawea, Hiaupe, Maunahina, Kilohana, Paliʻeleʻele, ʻAikanaka, Palikea, Puʻu Uaha, and Puʻu Nopili (Bier 2004). It is not within the scope of this assessment to explore these names further, but it is important to point out that the numbers of place names correlates to human presence. Places are nameless when they are not typically visited. The relatively flat arable bottom lands extend up valley only to about 1000 ft elevation (and the optimum growing conditions for kalo are below 500 ft elevation (Ladefoged et al 2009). The dearth of place names specific to upper Wainiha is an indication of its remoteness and a correlated lack of human occupation and use.

Much of Wainiha Valley, especially in its upper half, is characterized by extremely steep and rugged topography, unsuitable for significant agricultural pursuits (see Figure 3). The highest flat areas, below Lāʻau ridge at about 1000 feet elevation, are mentioned as the realm of the *Mū-ʻai-maiʻa* (the banana-eating *Mū* people), and various stories about their shyness, short stature, and quasi mythical nature are presented in Beckwith (1970) and other sources. Although some accounts indicate the *Mū* long ago left Wainiha and returned to their supernatural homelands, the physical manifestation left behind as evidence of their past occupation is the native bananas to be found at certain locations in Wainiha Valley. *Maiʻa* in hanging valleys along the cliffs of Wainiha occur all the way up to the head of the valley, in the vicinity of Hinalele Falls, though their frequency increases downward. Aside from these scattered *maiʻa*, and *kukui* (*Aleurites moluccana*) in the vicinity of the proposed fence route, none of the other Polynesian introductions indicative of past agriculture occur in the upper valley.

Winds & rains

Part of the cultural significance of an area is captured in Hawaiian characterizations of its dynamic natural features, the most prominent of which are winds and rains. Fornander (1917) provided some basic characterizations for the winds of Kauaʻi, though there is no description of the extent of these winds into the upland sections that comprise the Wainiha Preserve. For Northern Kauaʻi these winds are noted by Fornander (Vol. 5: page 97):

> *He Hulilua ko Hanaikawaa, He Amu ko Anahola, He Kololio ko Moloaa, He Kiukainui ko Koolau, He Meheu ko Kalihiwai, He Nau ko Kalihikai, He Luha ko Hanalei, He Waiamau ko Waioli, He Puunahele ko Waipa, He Haukolo ko Lumahai, He Lupua ko Wainiha, He Pahelehala ko Naue, He Limahuli ko Haena…*
>
> Hulilua is the wind of Hanaikawaa, Amu is the wind of Anahola, Kololio is the wind of Moloaa, Kiukainui is the wind of Koolau, Meheu is the wind of Kalihiwai, Nau is the wind of Kalihikai, Luha is the wind of Hanalei, Waiamau is the wind of Waioli, Puunahele is the wind of Waipa, Haukolo is the wind of Lumahai, Lupua is the wind of Wainiha, Pahelehala is the wind of Naue, Limahuli is the wind of Haena…

The Hawaiian Dictionary (Pukui & Elbert 1971) corroborates the name Lupua and further specifies:

Lū-pua -- n. Wind name associated with Wainiha, Kauaʻi. *Lit.*, flower scattering.

Being a very large valley, the Lūpua wind might only apply to the populous areas near the mouth of the stream. Names of rains are often shared with winds, especially if the two occur typically together. For example, the famous rain of Waimea, Hawaiʻi, the Kīpuʻupuʻu, is a cold, hard-hitting, wind-driven rain that raises chicken-skin. The name refers to both wind and rain. Thus at least some of the wind names listed above may also refer to rains, though it is not clear from their names.

The many terms for rains of the uplands, typically cold and accompanied by wind and fog/mist, such as ki‘owao, ko‘iawe, ‘awa, kēhau, kilihune, lelehune, noekolo, and uakoko, would apply certainly to the uplands of Wainiha, but are also generally applied to montane wet areas throughout the islands. The lack of described winds and rains specific to upper Wainiha is another indication of its remoteness and a correlated lack of human occupation and use.

Figure 3:
Upper Wainiha in the region of the proposed fence line. The area is trackless and remote, with no archeological features.

Photo credit: John De Mello

B. Historical/Archaeological and Cultural Sites

No archeological sites reported

Information gathered from these sources suggested that no archeological or historical sites have been reported in the area of the proposed fence line. It is highly informative that there are no recorded sites associated with the lands of the Wainiha Preserve, despite relatively intensive land use history and density of archeological sites at much lower elevations in the same land section. It should be pointed out that on Kaua‘i, rather unlike other islands, there are a few archeological sites noted from wet, montane locations, the most renown being Ka‘awakō *heiau* near the summit of Wai‘ale‘ale. This is an indication that Hawaiians did, at least occasionally, climb into the *wao akua*. Despite the proximity of Ka‘awakō to the edge of Wainiha Valley, the described route to the *heiau* is from the Waimea District, via Waimea Canyon, and the ridges leading up from there through the Alaka‘i wilderness to the summit. There are no records of Wainiha as a traditional route to the summit.

Consultations

In the extensive compilation of interviews conducted by Kepā Maly of residents of the north coast of Kaua‘i, the narratives paid "particular attention to the lands of Wainiha, Hā‘ena, Limahuli and Kē‘ē" (Maly & Maly 2003).

None of these kama‘āina informants were aware of any archaeological sites in the high mountainous areas of Wainiha. Descriptions of mountain resources did not include pigs or other feral animals, but more typically were either stream or vegetation-related. A few examples are excerpted here, although the full interviews are to be found in Maly & Maly 2003, and those interviews should be read in full to provide the correct context to these examples.:

> Excerpts from interview with Wayne Takashi Harada (WH), February 9, 2003 conducted by Kepā Maly (KM), Carlos Andrade (CA), Chipper Wichman (CW) and Takashi Harada (TH):
>
> <u>Discussing travels in the uplands above Lumaha‘i, Wainiha and Hā‘ena:</u>
> CA: Did you folks ever go *mauka* to pick *mokihana* or *maile* or anything like that?
> WH: I used to pick up *maile* in Wainiha Valley, and then we used to go, what was that name by the dry cave, Maniniholo?
> CW: Maniniholo? Mānoa Valley, yeah.
> WH: Mānoa outside the dry cave. We used to pick up there.
> WH: And I hunted all the way to the waterfall over Maniniholo.
> KM: Wow!
> WH: I could see people at the park.

Excerpts from interview with Annie Tai Hook-Hashimoto (AH), February 10, 2003 conducted by Kepā Maly (KM) and Chipper Wichman (CW):

Families went *mauka* [in Wainiha] to gather *wī* and *ʻōpae*.
AH: We used to go get only *wī*. We never used to go catch *ʻōpae* because we had one Aunty, Ella Doroin, she was Kanei. They only went when get big water, flood, then they go by the side of the stream and catch all the *ʻōpae*. So every time we wanted to eat *ʻōpae* we got it from them.
KM: She would take care?
AH: Unless my brother-in-law would bring from up the power plant, you know the tunnel?
KM: Yes, yes.
AH: The mountain, *kalaʻole*, that kind.

Archeological investigation

To further ascertain the potential of encountering archaeological sites and traditional cultural property in the Wainiha Fence Project area, TNC conducted, with Dr. Tom Dye, T.S. Dye & Colleagues, Archeologists, Inc., an ethno-historic investigation of the upper elevations of Wainiha in the region of the proposed fence line. They reviewed with Dye et al the proposed fence sites to determine the necessity of site visits by qualified archaeologists. No sites were encountered in this survey (Dye et al 2009).

C. Cultural and Traditional Practices

Little reference to traditional practices

Correlating with the dearth of archeological sites in the mauka lands of the ahupuaʻa comprising the Wainiha Preserve, there is very little reference to traditional activities associated with upper Wainiha Valley. Even the descriptions of land use along Lāʻau Ridge characterize the area as occupied by the Mū-ʻai-maiʻa (the banana-eating Mū people), described in some accounts as short, stocky, hairy, and shy (e.g., see accounts by Lydgate1920).

Of the few references in Maly & Maly (2003), none relate to farming or other practices that would have caused significant displacement of native forest; all descriptions of farming were below the lower boundary of the Wainiha Preserve. The mention of activities in upper Wainiha related to the practice of the *kahuna kiamanu* (bird-catching specialist) strongly suggests that the portion of Wainiha currently in the Preserve were not used for any of the typical needs of the *makaʻāinana* (common people).

Agriculture concentrated in lowlands

Similarly, references to land uses and sites in Wainiha Valley refer to agriculture and residence of the portion at and below Mauna Hina ridge, which marks the "dog leg" turn of the valley, and which lies well outside the Wainiha Preserve. All of the sites described by Bennet (1931), for example, are located along the lower leg of the valley. This is corroborated by the oral histories transcribed and published by Maly & Maly (2003).

Thus, as was typical in precontact, missionary, and monarchial times, agriculture was concentrated in the lowlands, in valley bottoms fed by continuous perennial streams and springs, and in areas of wet, mesic (and even dry) lowlands near the coast but above the influence of salt spray. This is consistent with a lack of significant archeological sites in the Wainiha Preserve, and a pattern of crown ownership of the uplands.

Cultural practices mentioned in interviews

According to the *kupuna* and *kamaʻāina* of Wainiha interviewed by Maly & Maly (2003), even the lower reaches of the Wainiha Preserve are only rarely visited by cultural practitioners for gathering of adornment, e.g., maile (*Alyxia oliviformis*). No problems have ever been reported regarding access from the landowners for traditional gathering practices. Primarily because of its remoteness, the Wainiha Preserve has not seen a long history of customary use as a hunting area, nor are there yet inordinately large numbers of feral animals in the upper portions of the Preserve that are the subject of this proposal.

Admission of visitors to the Kauaʻi watershed has been controlled by the individual landowners (e.g., Alexander & Baldwin, Kamehameha Schools, The State of Hawaiʻi). Every landowner within the KWA, however, has indicated via the KWA management plan that they honor native Hawaiian gathering rights.

D. Cultural impacts and benefits of the proposed actions

Alien species control benefits archeological sites

Under the direction of the KWA, the Wainiha Fence Project represents continued progress in the protection of cultural sites in the high elevations of the Kaua‘i watershed, initiated by the fencing project of the Alaka‘i, that includes protection of the heiau Ka‘awakō near the Wai‘ale‘ale summit (OEQC 2009). Ungulates, particularly feral pigs, cattle and goats, are known to disturb archaeological sites because they knock over stone walls, turn over soil, spread noxious weeds, and initiate accelerated erosion and landslides. Strawberry guava (*Psidium cattleianum*) is a weedy tree spreading rapidly in the Kaua‘i Watershed, in part, because of the foraging of feral pigs. Strawberry guava forms impenetrable thickets and develops strong root systems that can destroy the integrity of an archaeological site. One of the long-term goals of the KWA is to stop the spread of invasive weeds such as strawberry guava and restore native forest cover.

Fencing

The Wainiha Fence Project is focused on protecting native forest cover by constructing strategic fences and removing non-native animals and weeds. Neither of these activities is meant to impede human access or cultural practices. Project fences across traditional trails or more modern routes used by hikers can have gates installed to make for easier crossings if necessary. Even this courtesy is unlikely to be necessary for the remote Wainiha fence, but as needed, these gates may be of the same design as planned for the Alaka‘i and Kanaele fence projects.

It is suggested here that further outreach to inform the community about the purpose of the fences will help alleviate negative perceptions. In this vein, the KWA has expanded its outreach activities to local communities around the mountain highlighting the need for watershed protection.

Hawaiian gathering rights

Every landowner within the KWA has indicated that they honor native Hawaiian gathering rights. The Kaua‘i Office of The Nature Conservancy of Hawai‘i (TNCH) defers access questions to the appropriate landowner for disposition. On its own lands, TNCH has maintained a specific policy to honor traditional access rights since 1983, which was further elaborated on in 1996 to include intellectual property rights (TNCH 1996). These practices apply to all TNCH lands in Hawai‘i. No problems have ever been reported regarding access to upper Wainiha for traditional gathering practices.

The watershed protection efforts occurring on Kaua‘i will help protect and maintain populations of native plants important to native Hawaiian cultural practices (KWA 2005). The project area also represents refugia for endemic plants that historically had great cultural or economic significance to native people. Examples include: the famous laua‘e fern (*Microsorum spectrum*) used in lei; olonā (*Touchardia latifoli*a) used for remarkably strong cordage for fishnets, a base for feather capes, and rope; and ma‘oloa (*Neraudia melastomaefolia*) the bark fibers of which were used to produce ceremonial kapa. By protecting ethnobotanical plants, the project is enhancing the renaissance of Hawaiian culture, and ensuring continual practice into the future.

The Wainiha Fence Project is also benefiting traditional native Hawaiian gathering of freshwater animals including mountain ʻōpae (*Atyoida bisulcata*), ʻoʻopu (various species of gobiid fish), and hīhīwai (*Neritina granosa*). These aquatic organisms thrive with abundant clean, cool stream flow and are dependent on healthy watersheds for their survival.

Within the Wainiha Fence Project area, access to Wainiha Preserve proper is by permit only and will only be approved for legitimate scientific or cultural activities that do not significantly impose negatively impacts on the living native resources of the preserve. There are no well-used trails into the project area, and the project does not curtail legitimate Hawaiian cultural access.

E. Summary Description of the Action's Effect on Cultural Sites and Practices

The KWA, of which the Conservancy is a management coordinator, is committed to reversing the current degradation of the natural resources of the Kaua‘i Watershed caused by the damaging effects of non-native plants and animals. Reduced populations of ungulates and aggressive weeds will also help to protect the integrity of the region's cultural sites. The fence segments proposed for the Wainiha Fence Project will not impede legitimate public access, nor is it anticipated that the KWA management activities will curtail any existing, legal public use of the watershed. Any person who is in good enough physical condition to hike to a strategic fence will have no problem crossing over the fence. Field workers will be instructed to halt fence work and report to proper authorities should they encounter any evidence of a suspected archaeological site. With regard to Wainiha Preserve proper, the conclusion of Dye et al 2009 is that, relative to State Historic Preservation Division (SHPD) guidelines, the proposed activities will have no negative effect on significant historic sites.

F. Mitigation of cultural impacts

Given the sparse historical/traditional use of the lands comprising the Wainiha Preserve, reflected by a lack of archeological sites, the key mitigation actions for cultural impacts are to provide protection of irreplaceable native species and ecosystems forming the living foundation of Hawaiian culture, and ensure appropriate and sustainable access to these resources for traditional use. There is no current need for additional mitigation, aside from maintaining and practicing in accordance with landowner policy.

Sources

Andrews, L. 1865. *A Dictionary of the Hawaiian Language*. Privately published, Lahaina, Maui, HI.

Bennett, W.C. 1931. Archeology of Kaua‘i. *Bernice Pauahi Bishop Museum Bulletin* 80: 156 pp + figures.

Beckwith, M. 1970. *Hawaiian Mythology*. University of Hawai‘i Press, Honolulu.

Bier, J.A. 2004. *Map of Kaua‘i*. University of Hawai‘i Press.

Dye, T. et al 2009. *An Archeological Survey for an Animal Control Fence in Wainiha Valley, Kaua‘i.* Archeological Survey produced for The Nature Conservancy for the benefit of the Kaua‘i Watershed Alliance, to accompany the Environmental Assessment for the proposed fence in Wainiha Valley.

Fornander, A. 1917. Fornander Collection of Hawaiian Antiquities and Folk-Lore. The Hawaiian Account of the Formation of Their Islands and Origin of Their Race with the Traditions of Their Migrations, Etc., As Gathered from Original Sources. *Bernice Pauahi Bishop Museum Memoirs: Vol. IV.* Bishop Museum Press, Honolulu, Hawai‘i

Kaua‘i Watershed Alliance. 2005. *Kaua‘i Watershed Alliance Management Plan.* Prepared by The Nature Conservancy of Hawai‘i, published privately. Līhu‘e, Kaua‘i.

Ladefoged, T.N., P. Kirch, S. Gon, O. Chadwick, A. Hartshorn , P. Vitousek. 2009. Opportunities and constraints for intensive agriculture in the Hawaiian archipelago prior to European contact. *J. Archaeol. Sci.* (2009), doi:10.1016/j.jas.2009.06.030

Lydgate, J.M. 1920. The Winning of the Mu-Ai-Maia Maiden. *29th Annual Report, Hawaiian Historical Society.*

Maly, K. & O. Maly. 2003. "Hana ka lima, ‘ai ka waha:" a collection of historical accounts and oral history interviews with kama‘āina residents and fisher-people of lands in the Halele‘a-Nāpali region on the island of Kaua‘i. Prepared for: The Nature Conservancy of Hawai‘i, 923 Nu‘uanu Avenue, Honolulu, Hawai‘i 96817 & The National Tropical Botanical Gardens – Limahuli Gardens, Hui Maka‘āinana o Makana, Limahuli Garden ICMI Project.

Office of Environmental Quality Control (OEQC). 2007. Final Environmental Assessment for Kanaele Bog Protective Fence. Online at: http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Kauai/2000s/2007-05-KA-FEA-Kanaele-Bog-Protective-Fence.pdf

Office of Environmental Quality Control (OEQC). 2009. Final Environmental Assessment for East Alaka‘i Protective Fence. Online at:

http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Kauai/2000s/2009-03-08-KA-FEA-East-Alakai-Protective-Fence.pdf

Pukui, M.K., & S.H. Elbert. 1971. *Hawaiian Dictionary*. University of Hawai‘i Press, Honolulu.

Pukui, M.K., S.H. Elbert & E.T. Mookini. 1974. *Place Names of Hawai‘i*. The University Press of Hawai‘i, Honolulu.

The Nature Conservancy of Hawai‘i. 1996. *Practice and Principles for Working with Indigenous Communities: Hawai‘i Draft.* Internal policy statement prepared by S. Gon, R. Hagenstein & S. Case.

Hale Kuamo‘o, Ka Haka ‘Ula O Ke‘elikōlani & Alu Like, Inc.2009. *Ulukau: The Hawaiian Electronic Library*. URL: http://ulukau.org/ University of Hawai‘i at Hilo: College of Hawaiian Language.