Kilauea Point National Wildlife Refuge

Land Conservation Plan and Environmental Assessment

Kaua'i County, Hawai'i

Prepared By:

U.S. Fish and Wildlife Service
Michael "Mitch" Mitchell, Deputy Project Leader
Kaua'i National Wildlife Refuge Complex
P.O. Box 1128
Kilauea, Hawai'i 96754
Phone: (808) 826-6641

May 2007

Table of Contents

CHAPTER 1. PURPOSE AND NEED FOR ACTION……....1
1.1 Introduction…….1
1.2 Proposed Action……..1
1.3 Need for Action……..1
1.4 Purpose of the Proposed Action…….2
1.5 Study Area……..2
1.6 Related Agency Actions……..…..…….....3
1.7 Decisions to be Made.……..……..…..……....3
1.8 Public Involvement and Identification of Issues...……...……..4
1.9 Legal and Policy Guidance..……..……..…….4
1.9.1 Mission of the National Wildlife Refuge System..……..…….4
1.9.2 Purpose of the Kilauea Point National Wildlife Refuge Expansion…..……..5
1.9.3 Acquisition Policies……..…...5
1.9.4 Land Acquisition Process……..…..6
1.9.5 Refuge Revenue Sharing Act of 1935, as Amended..…….....6
1.9.6 Compliance……..……....7
1.9.7 Scope of the Environmental Assessment.……..……7

CHAPTER 2. PROPOSED ALTERNATIVES…….....9
2.1 Land Selection……..……...9
2.2 Parcels Considered but Excluded from Detailed Study…….……10
2.3 Alternatives Considered in Detail…..…….……10
2.3.1 Alternative A – No Action……...…….……..10
2.3.2 Alternative B – the Coastal Alternative……..…….……...10
2.3.3 Alternative C – the Riverine Alternative…….……..11
2.3.4 Alternative D – Coastal and Riverine Alternative – Preferred Alternative...11
2.4 Comparative Evaluation of Alternatives……...12
2.5 Habitat Protection Methods……...……13
2.6 Land Protection Priorities by Parcel…….…….……14

CHAPTER 3. AFFECTED ENVIRONMENT……...…..……17
3.1 Overview of the Proposed Project Area……..……17
3.2 Physical Environment……17
3.2.1 Topography……17
3.2.2 Soils…….……18
3.2.3 Geology…..…….……18
3.2.4 Climate…….…….……..19
3.2.5 Hydrology…….…….……19
3.3 Social and Economic Environment…….……...20
3.3.1 Population and Local Community…….……20
3.3.2 Employment and Local Economy……...……21
3.3.3 Tax Revenues…….……22
3.4 Historic and Present Land Use, Development, and Public Use…….22
3.4.1 Historic Use…….……22

3.4.2 Present Land Use, Development, and Public Uses...……..23
3.5 Archaeological and Historic Resources…..……25
3.5.1 Previously Recorded Sites……..25
3.5.2 Archaeological and Historic Resources Preservation Recommendations…..27
3.6 Biological Resources……..…27
3.6.1 Natural Communities……..27
3.6.2 Endangered Species……29
3.6.3 Other Species…….…….……33

CHAPTER 4. CONCEPTUAL MANAGEMENT AND ENVIRONMENTAL CONSEQUENCES……..……..…..……....35
4.1 Alternative A (No Action)……..……..……35
4.1.1 Effects on the Physical Environment..……..……...35
4.1.1.1 Climate and Soils……..……..……..35
4.1.1.2 Hydrology and Water Resources……..……..……..35
4.1.2 Effects on the Biological Environment..……..……36
4.1.3 Effects on the Social and Economic Environment...……..……36
4.2 Alternative D – Preferred Alternative……..……..…..……36
4.2.1 Effects on the Physical Environment...……..…..……36
4.2.1.1 Climate and Soils……..…..……..36
4.2.1.2 Hydrology and Water Resources……..……..……..37
4.2.2 Effects on the Biological Environment……..……..……37
4.2.2.1 Threatened and Endangered Species……..……..37
4.2.2.2 Other Native Species……...41
4.2.3 Habitat Protection and Open Space Preservation……..……..42
4.2.4 Effects on the Social and Economic Environment.……44
4.2.4.1 Cultural Resources……..…….....44
4.2.4.2 Recreation and Tourism……..…….....44
4.2.5 Other Effects……..……46
4.2.5.1 Long-term Conservation of Biological Productivity and Diversity…….....46
4.2.5.2 Unavoidable Adverse Effects……..46
4.2.5.3 Cumulative Impacts……46
4.3 Comparison of the Alternatives and Rationale for the Preferred Alternative.47
4.3.1 Rationale for Selection of the Preferred Alternative…..……48

CHAPTER 5. COORDINATION, CONSULTATION, AND COMPLIANCE……...…..51
5.1 Public Involvement……51
5.2 Environmental Review and Consultation……...51
5.2.1 National Environmental Policy Act……51
5.2.2 National Historic Preservation Act……52
5.2.3 Endangered Species Act……52
5.2.4 Other Federal laws, Regulations, and Executive Orders……52
5.2.5 Distribution and Availability……..52

CHAPTER 6. REFERENCES……...……53

FIGURES

FIGURE 1. Kilauea Point NWR Legislated Expansion Area…….following page 1
FIGURE 2. Kilauea Point NWR Refuge Expansion Study Area……following page 2
FIGURE 3. Kilauea Point NWR Refuge Exclusion from All the Alternatives.....following page 10
FIGURE 4. Kilauea Point NWR Alternative B……..……...following page 10
FIGURE 5. Kilauea Point NWR Alternative C…….....following page 11
FIGURE 6. Kilauea Point NWR Alternative D……..……...following page 11
FIGURE 7. Kilauea Point NWR Expansion Study Area.....following page 13

TABLES

TABLE 1. Summary Comparison of the Alternatives……12
TABLE 2. Land Tract and Priority Information…….14
TABLE 3. Demographics of the Kilauea Town Residents…….21
TABLE 4. 2006 Tax Rates for the County of Kaua'i…….22
TABLE 5. Environmental Consequences Comparison……..47

APPENDIX A. Public Law 108-481……....57
APPENDIX B. Notification List for the Environmental Assessment…….....59
APPENDIX C. Botanical and Avifauna data…….....63

CHAPTER 1. PURPOSE AND NEED FOR ACTION

1.1 Introduction

The U.S. Fish and Wildlife Service (Service) is the primary Federal agency responsible for conserving and enhancing the nation's fish and wildlife populations and their habitats. Although the Service shares this responsibility with other Federal, state, tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, federally-listed threatened and endangered species, and certain anadromous fish and marine mammals. Service efforts over the last 100 years to protect wildlife and their habitat have resulted in a network of protected areas that form the National Wildlife Refuge System (Refuge System). This network of protected areas is the largest and most diverse in the world. Refuge System lands provide essential habitat for numerous wildlife species, wildlife-dependent recreational opportunities for the public, and a variety of benefits to local communities.

1.2 Proposed Action

The Service proposes to expand the Kilauea Point National Wildlife Refuge (Refuge), located in Kaua‘i County, Hawai‘i. In this draft Land Conservation Plan/Environmental Assessment (LCP/EA), the Service describes the purpose and need for protecting the wildlife and habitat associated with the proposed Refuge expansion, and analyzes the consequences of a range of alternatives for Refuge expansion. This document was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.).

1.3 Need for Action

Congress authorized the Service to expand the Refuge with up to 234 acres on five specific parcels by donation, purchase with donated or appropriated funds, or exchange under the Kilauea Point National Wildlife Refuge Expansion Act of 2004 (see Appendix A). The current approved Refuge boundary includes 203 acres.

The Refuge expansion would protect high quality coastal and lowland areas (wetlands, coastal strand, aquatic habitats, and their associated uplands) in perpetuity. Protection and management of these areas would allow the Service to contribute to the recovery of endangered or threatened species and to support other native plants and animals. The lands identified for addition to the Refuge include sea bluffs to the east and west of the Refuge, coastal dunes, the Kilauea estuary located both to the east and south, wetlands, grasslands, and riparian woodlands associated with the Kilauea Stream and Kilauea Falls in the Kilauea River valley, near the town of Kilauea on the north shore of the Island of Kauai (see Figure 1).

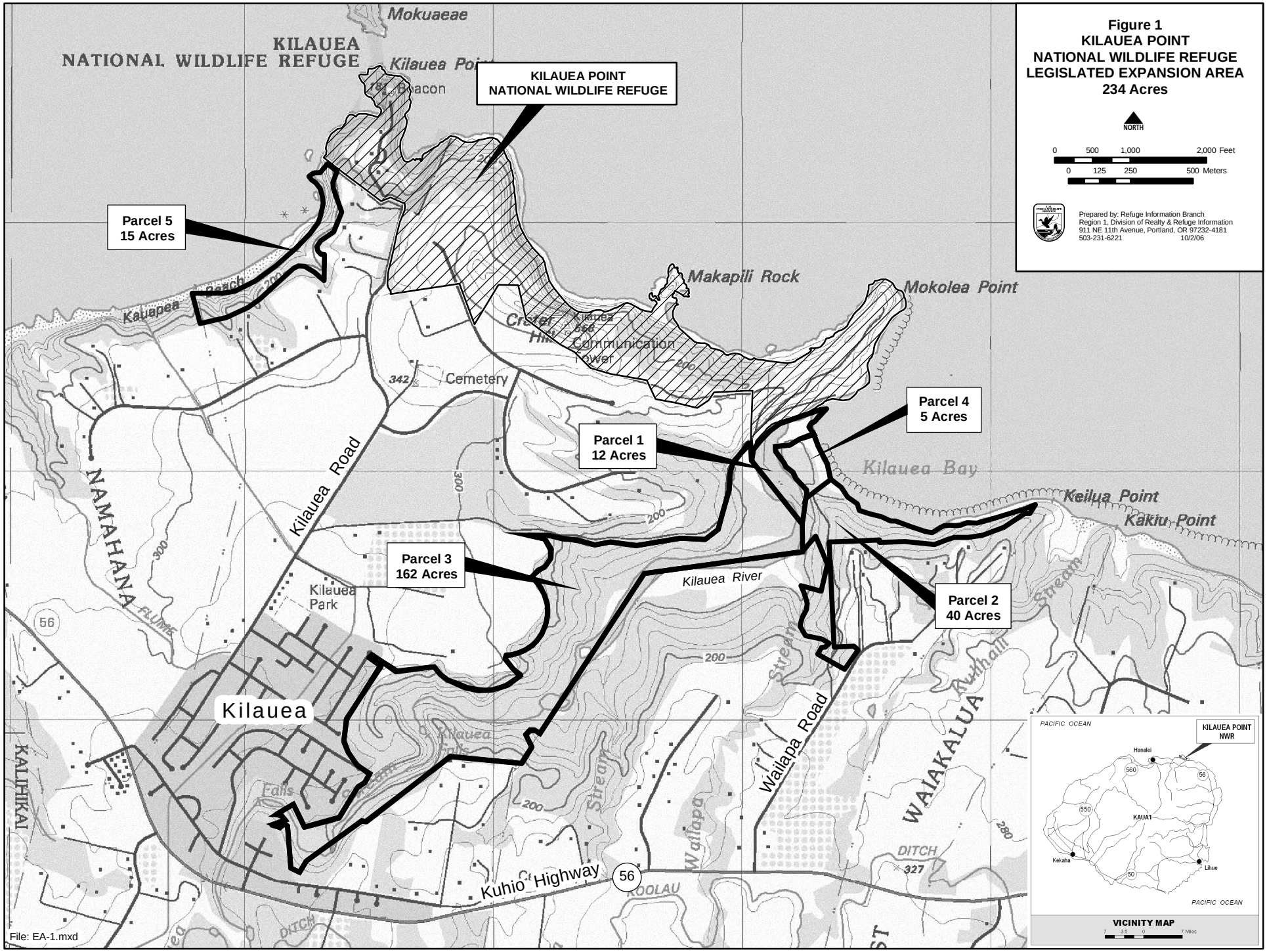
Figure 1
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
LEGISLATED EXPANSION AREA
234 Acres
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT NATIONAL WILDLIFE REFUGE
Parcel 5
15 Acres
Parcel 4
5 Acres
Parcel 1
12 Acres
Parcel 3
162 Acres
Parcel 2
40 Acres
Mokuaeae
KILAUEA NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kilauea Bay
Keilua Point
Kakiu Point
Kilauea Crater Hill
Communication Tower
Cemetery
Kilauea Road
NAMAHANA
Kilauea Park
Kilauea River
Kilauea
Kilauea Falls
Wailapa Road
WAIAKALUA
KALIHIKAI
Kuhio Highway
56
DITCH
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
KAUA'I
Kekaha
Lihue
VICINITY MAP
File: EA-1.mxd

1.4 Purpose for the Proposed Action

The purpose of the proposed Refuge expansion, as stated in the Kilauea Point National Wildlife Refuge Expansion Act (Public Law 108-481) is:

(1) the protection and recovery of endangered Hawaiian water birds and other endangered birds, including the Nene (Hawaiian goose); and

(2) the conservation and management of native coastal strand, riparian, and aquatic biological diversity.

The purposes of the existing Refuge would apply to the expansion area as well. Refuge purposes were established when the Kilauea Point Lighthouse was transferred from the U.S. Coast Guard to the Service in 1985. In 1988, the Crater Hill area was donated to the Refuge, a small portion of which is located adjacent to the Kilauea River on its northeastern boundary. Mokolea Point was purchased by the Service in the same year. The Refuge's original 1985 establishing purposes apply to these two additions as they would to the proposed expansion area:

(1) Conserve migratory seabird and endangered Nene populations and habitat;
(2) Preserve and maintain historical integrity of the Lighthouse;
(3) Conduct environmental education activities on Hawaiian wildlife and the National Wildlife Refuge System;
(4) Interpret and orient Refuge resources for visitors; and
(5) Protect and enhance native coastal plant communities.

The acquisition of lands for the Refuge would have additional benefits including:

- Protection and enhancement of nesting areas for native species such as seabirds and wintering shorebirds;
- Conservation and enhancement of aquatic resources;
- Protection and restoration of native plant communities; and
- Enhancement of opportunities for compatible wildlife-dependent visitor uses.

Conservation of lowland coastal habitats would also help maintain the rural character of Kaua'i's north shore by precluding subdivision and development of the lands that are ultimately purchased for inclusion in the Refuge.

1.5 Study Area

The Kilauea Point National Wildlife Refuge Expansion Study Area (Study Area) encompasses the five parcels of land totaling 234 acres, identified in the Kilauea Point National Wildlife Refuge Expansion Act (see Figure 2). However, a 3-acre portion of Parcel 2 (later named Parcel 6) was sold to the Kauai Public Land Trust with the goal of having the Service eventually manage the parcel as part of the expanded Refuge.

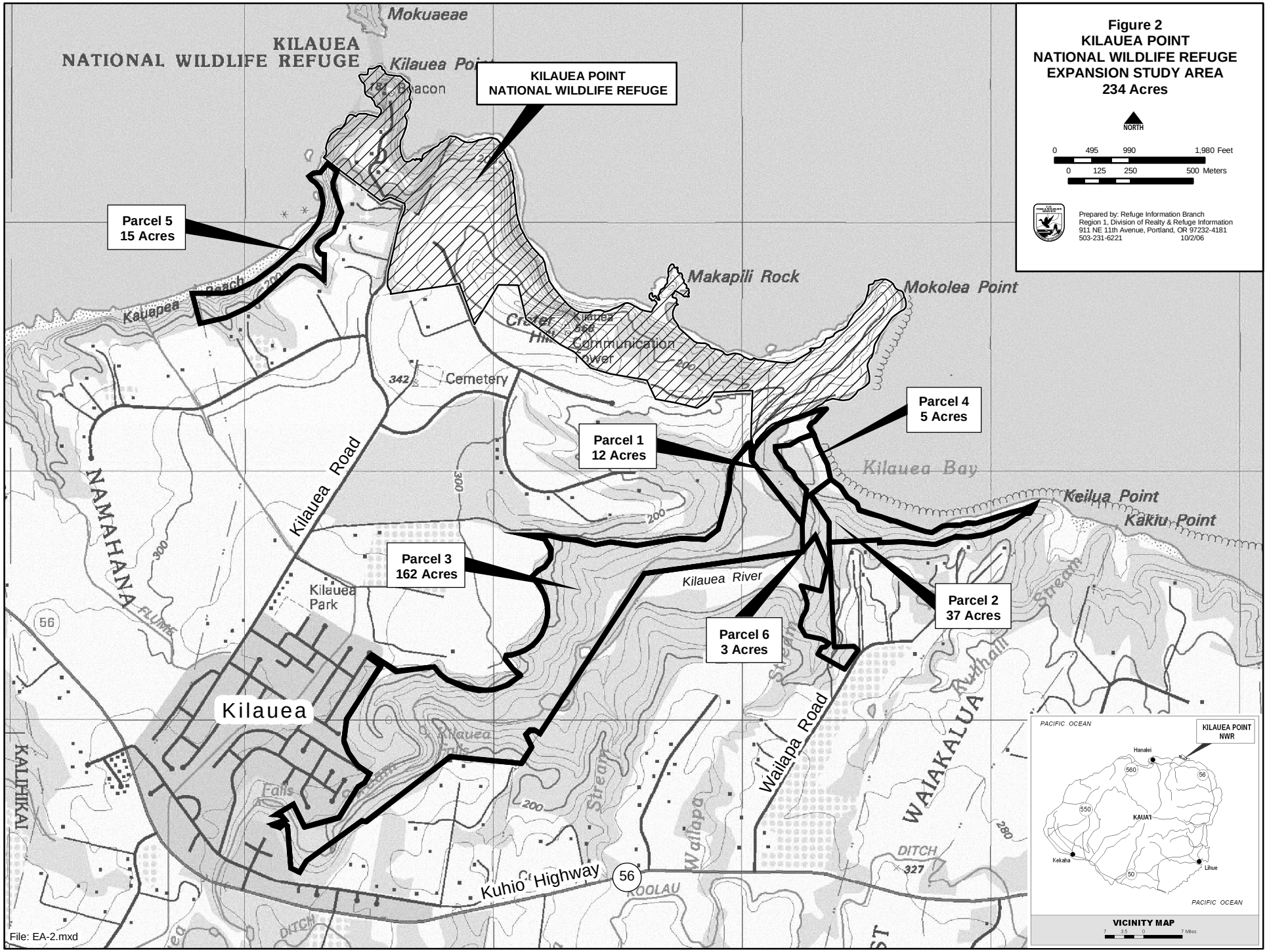
Figure 2
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
EXPANSION STUDY AREA
234 Acres
NORTH
0 495 990 1,980 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT NATIONAL WILDLIFE REFUGE
Parcel 5
15 Acres
Parcel 1
12 Acres
Parcel 4
5 Acres
Parcel 3
162 Acres
Parcel 2
37 Acres
Parcel 6
3 Acres
Mokuaeae
KILAUEA NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kilauea Bay
Keilua Point
Kakiu Point
Kilauea Road
Cemetery
Communication Tower
Kilauea River
Kilauea Park
Kilauea
NAMAHANA
KALIHIKAI
WAIAKALUA
Wailapa Road
Kuhio Highway
56
File: EA-2.mxd
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
KAUA'I
Kekaha
Lihue
VICINITY MAP

- Parcel 1: 12.4-acre Kilauea Bay property owned by Kilauea Bay Consortium (TMK 4-5-1-05-12).

- Parcel 2: 37-acre portion of Kilauea Vistas property owned by Kilauea Vistas Condominium (TMK 4-5-1-5-0-16).

- Parcel 3: 162-acre parcel known as "Kilauea Falls Ranch" and owned by B&Z Properties (TMK 4-5-2-1-2-35).

- Parcel 4: 5.25-acre parcel owned by Kaua‘i Public Land Trust (TMK 4-5-1-5-0-16).

- Parcel 5: 15-acre privately owned parcel northwest of the Refuge (TMK 4-5-2-0-4-71).

- Parcel 6: 3-acre parcel previously owned by Kilauea Vistas Condominium (formerly parcel 2) and sold to Kaua'i Public Land Trust in 2006 (TMK 4-5-1-5-16).

1.6 Related Agency Actions

The Refuge Manager at Kilauea Point Refuge also administers the Hanalei and Hule‘ia National Wildlife Refuges, to the west and southwest of the Refuge, respectively. Both of these Refuges are managed primarily for the recovery of Hawai‘i's endangered waterbirds.

The Hawai‘i Department of Land and Natural Resources manages fisheries and aquatic resources in the Kilauea River and collaborates with the Service in managing federally-listed endangered species. Nongovernmental organizations active in the area include the Kaua‘i Public Land Trust and the Kilauea Point Natural History Association, both are supportive of this expansion project.

1.7 Decisions to Be Made

Based on the analysis documented in this LCP/EA, the Regional Director of the Service will determine which alternative to adopt for Refuge expansion and whether the selected alternative would have significant impacts on the quality of the human environment.

The authorities for this habitat protection effort are the Kilauea Point National Wildlife Refuge Expansion Act of 2004 and the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended by the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System Administration Act authorizes the acquisition and management of land for the Refuge System.

1.8 Public Involvement and Identification of Issues

The Service worked closely with a number of government agencies, nongovernmental conservation organizations, affected landowners, Refuge neighbors, and other interested stakeholders and citizens to identify issues and develop this proposal.

In May and November 2005, portions of two Refuge Planning Updates mailed to interested parties were covered in the local newspaper, the Garden Island News. The Planning Updates informed members of the public about the project and solicited comments early in the planning phase. The Planning Updates also provided a map of the area and described potential management actions.

The refuge Manager presented information on the Refuge proposal at a Kilauea Neighborhood Association meeting held on June 7, 2005. Seventy-five community member attendees were presented the four proposed alternatives, and their comments were recorded. Public comments ranged from "fully supportive of the largest expansion" to "adamantly opposed to any Refuge expansion," and a range of issues were raised. Specifically, public concerns were expressed regarding the effects of the acquisition on the following.

- Beach access
- Recreational use of beach, river, and falls
- Expansion of ecotourism
- Traditional Hawaiian cultural practices and resources
- Opportunity to have input on a detailed proposal

These issues and the effects of the land acquisition on other features of the affected environment including endangered species and other native wildlife, the local economy, and Refuge management are addressed in this LCP/EA.

1.9 Legal and Policy Guidance

The Kilauea Point National Wildlife Refuge is managed as part of the Refuge System within a legal and policy framework. The Refuge is guided by the mission and goals of the Refuge System and the purposes of the Refuge as described in its acquisition authorities. Management programs are developed and conducted in compliance with international treaties, applicable Federal laws and executive orders, and Service policy.

1.9.1 Mission of the National Wildlife Refuge System

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

1.9.2 Purpose of the Kilauea Point National Wildlife Refuge Expansion

By Refuge System policy, the lands acquired for an existing refuge must incorporate the primary purposes for which the parent refuge was established, which in this case are to:

> "….protect and enhance migratory seabird and endangered native Nene (Hawaiian goose) populations and their habitat; to preserve and maintain the historical integrity of the area, including the lighthouse and support facilities, which was listed on the National Register of Historic Places in 1979; conduct interpretation and environmental education activities on Hawaiian wildlife, site history, and the refuge system; and protect and enhance native coastal plant communities."

Thus, the purposes noted above would also apply to the lands identified in the Kilauea Point National Wildlife Refuge Expansion Act (Public Law 108-481) which, if acquired by the Service, would become part of the existing Refuge. Two additional Refuge purposes would be added to the original Refuge purposes and be specifically applicable only to the expansion area:

> "to conserve, protect, and manage essential habitat of the endangered Hawaiian monk seal, threatened green sea turtle, and endangered Hawaiian hoary bat; conserve the native aquatic resources of Kilauea estuary and the portion of the Kilauea Stream and riparian areas within the Refuge; and conserve, protect, and manage other native plant and animals that rely on these areas as habitat."

1.9.3 Acquisition Policies

The Service's land protection policy is to acquire land only when other protective means to achieve program goals (such as zoning or regulation) are not appropriate, available, or effective. When lands are to be acquired, the minimum interest necessary to reach management objectives is acquired or retained. The Service strives to reduce costs by acquiring land through donation, exchange, transfer, withdrawal, permit, and by cooperative agreements with landowners. When the Service determines it is necessary to acquire land, it acquires fee title (control of all property rights) only if acquisition of lesser property interest (such as easements or leases) is not available or would not achieve its conservation objectives.

It is Service policy to acquire lands from willing sellers and to offer fair market value for the land. Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, requires that the Service offer a landowner 100 percent of fair market value of the property (as determined by an approved appraisal) and provide certain benefits and payments to persons displaced by the acquisition of land.

It is Service policy to acquire lands that are not contaminated. The Environmental Protection Agency's records indicate that no Superfund sites (CERCLIS database) are

identified in the County of Kaua'i. Five Superfund sites are identified on the Island of Oahu, approximately 100 miles from this proposed expansion area on Kaua'i.

Site specific Pre-Acquisition Level I Contaminant Surveys would be conducted for each parcel prior to completion of acquisition. Other than an old community dump site identified on Parcel 3 (estimated maximum area of 90,000 sq. ft.), no contaminant or hazardous waste materials are known to exist on the property; and, considering the past and current land use of the property, the likelihood of contamination is low.

1.9.4 Land Acquisition Process

The Service acquires land for national wildlife refuges in a manner consistent with legislation or other congressional guidelines and Executive Orders. The Service can protect habitat through various means such as: (1) the purchase of fee title or conservation easements, (2) no-cost transfers, (3) donations, and, (4) exchanges.

Acquisition funding may be made available through the Land and Water Conservation Fund or other sources to acquire lands, waters, or interest therein for fish and wildlife conservation purposes. The Federal monies used to acquire private lands through the Land and Water Conservation Fund are derived primarily from oil and gas leases on the outer continental shelf, excess motorboat fuel tax revenues, and the sale of surplus Federal property.

The basic considerations in acquiring land are: (1) biological significance of the land, (2) existing and anticipated threats to wildlife resources, and (3) landowners' willingness to sell or otherwise make property available to the project. The purchase of lands proceeds according to willingness of sellers and availability of funds.

The Service has no authority to acquire land except within an approved refuge acquisition boundary. An approved refuge boundary authorizes the Service to purchase an interest in real property, such as fee title or a conservation easement, from landowners who are willing sellers.

1.9.5 Refuge Revenue Sharing Act of 1935, as Amended

Under provisions of the Refuge Revenue Sharing Act (16 U.S.C. 715s), the Service would make an annual payment to Kaua'i County to help offset property tax revenue lost as a result of acquisition of private property. This law states that the Secretary of the Interior (Secretary) will pay to each county in which an area acquired in fee title is situated the greater of the following amounts:

- An amount equal to 75 cents per acre for that portion of the fee area which is located within such county;

- An amount equal to 3/4 of 1 percent of the fair market value, as determined by the Secretary, for that portion of the fee area that is located within such county;

- An amount equal to 25 percent of the net receipts collected by the Secretary in connection with the operation and management of Public Domain lands during each fiscal year.

If these funds are insufficient to make full payments to the counties, Congress is authorized to appropriate funds to make up any shortfall. When Congress does not appropriate sufficient funds, counties receive a pro-rata reduction in their Refuge Revenue Sharing Act disbursement.

The Refuge Revenue Sharing Act also requires that Service lands be reappraised every five years to ensure that payments to local governments remain equitable. Payments under this Act would be made only on lands that the Service acquires in fee title. On lands where the Service acquires only partial interest through easement, all taxes would remain the responsibility of the individual landowner.

1.9.6 Compliance

The proposed acquisition will be in compliance with Service policies and the following laws and regulations: National Environmental Policy Act of 1969, as amended; Executive Order 12372 (Intergovernmental Review of Federal Programs); Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands); Endangered Species Act of 1973, as amended; Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs (Uniform Act of 1970), as amended; Executive Order 11593 (Protection of Historical, Archaeological, and Scientific Properties) including the National Historic Preservation Act of 1966, as amended; the Archaeological Resources Protection Act; the Native American Graves Protection and Repatriation Act of 1990; Coastal Zone Management Act of 1972, as amended; Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System); Secretary's Order 3127 (Contaminants and Hazardous Waste); and the National Wildlife System Administration Act of 1966, as amended; and other applicable laws.

1.9.7 Scope of the Environmental Assessment

This LCP/EA evaluates the environmental effects of adding and managing new Refuge lands. While this LCP/EA does not cover the details of future Refuge management for the proposed expanded Refuge, conceptual management actions are described to indicate potential management direction until such time as a Comprehensive Conservation Plan (CCP) is prepared for the Refuge.

The Refuge's CCP is scheduled to begin in 2007. The in-depth CCP planning process includes public involvement that will give the community and general public a number of opportunities to review and comment on new management plans for this expansion area and the existing Kilauea Point, Hanalei, and Hule‘ia National Wildlife Refuges.

CHAPTER 2. PROPOSED ALTERNATIVES

2.1 Land Selection

The 108th Congress passed legislation in December 2004 (Public Law 108-481) authorizing the expansion of the Refuge by up to 234 acres. The five parcels identified in PL 108-481 are described in more detail below. These parcels were included by sponsors of the legislation because they have value as wildlife habitat and therefore complement the Service's mission and Refuge purposes, the lands are in close proximity to the existing Refuge, landowners expressed a willingness to consider an offer by the Service to purchase the lands, and some of the parcels contain habitat types not yet represented or protected within the Refuge System. The expansion would enhance the recovery of up to eight federally-listed endangered or threatened species and would create a contiguous unit of more than 400 acres of federally-protected Refuge land along Kaua'i's rapidly developing coast, for Hawai'i's endangered and native wildlife and for the enjoyment of the American people.

Parcels 1, 2, 4, and 5 would add coastal dune and bluff habitats, along with areas of riparian and aquatic habitat of the Refuge. Parcel 1 consists of mainly shallow aquatic habitat located at the mouth of the Kilauea River, with a small area (<1 acre) of coastal dune and sand spit. Parcels 2 and 5 are both coastal bluffs that afford opportunity to increase native seabird nesting habitat that could be enhanced and protected from future encroachment and disturbance. The coastal dunes of parcel 4 provide an excellent opportunity to restore native coastal dune vegetation, protect and interpret valuable Native Hawaiian cultural resources, establish two additional monk seal pupping and resting areas, and protect additional green sea turtle resting and nesting habitat.

Parcel 3, the largest portion of land in the proposed expansion, has a variety of habitats, some of which are especially valuable lowland wetland habitat that would, with proper management, aid in the recovery of four endangered Hawaiian waterbird species (the Hawaiian Duck, Hawaiian Moorhen, Hawaiian Coot, and Hawaiian Stilt). At least 15 acres of existing wetland could be restored in order to support high quality feeding, roosting, and nesting habitat for all four of the endangered waterfowl species. Additionally, there is the potential to restore 20-35 acres of grassland habitat, ideal for Nene foraging, nesting, and roosting. If restored and managed, the grassland habitat could also provide nesting opportunity for native Laysan Albatross.

Parcel 3 also contains approximately 20 acres of fresh and brackish aquatic habitat, 17 acres of brackish marsh, 25 acres of coastal lowland riparian habitat, 50 acres of mainly nonnative lowland forest, and 5 acres of inland cliff face. The aquatic habitat supports an array of native aquatic species that have been negatively impacted by exotic species introduction, but have high restoration potential. The terrestrial environment is heavily impacted by invasive plant species, but also has a high restoration potential.

Service management of newly acquired parcels would be minimal until the CCP is completed for the Refuge. Routine, low-impact Refuge management activities that may occur on the Refuge in the interim could include boundary posting and installation of nominal Refuge signage; maintenance of existing unimproved roads and walking paths; installation of access control gates; routine law enforcement patrols; habitat protection; wildlife and habitat baseline studies and monitoring; and low levels of compatible wildlife-dependent public uses that could be authorized by permit.

Potential interim Refuge management activities that involve ground clearing, work within a wetland or floodplain, and any management activity or project that is not considered minor or routine would undergo environmental review and public involvement in accordance with applicable laws.

Access over and through Refuge lands would continue to be controlled by gates in the same manner that private landowners control access to the parcels now. Under all the alternatives being considered, the Service would not have jurisdiction to control public access to the coast along existing public right-of-ways.

2.2 Parcels Considered but Excluded from Detailed Study

During the scoping period, the Service determined that approximately 17 acres of Parcel 2 included in the 2004 legislation should be excluded from further consideration, because of the area's limited wildlife habitat value. Thus, the 17-acre portion of Parcel 2 was excluded from the draft alternatives (see Figure 3).

2.3 Alternatives Considered in Detail

The following alternatives were developed using geographic and habitat type criteria. Alternatives include: A) No Action, B) Coastal, C) Riverine, and D) Coastal and Riverine.

2.3.1 Alternative A - No Action

Under Alternative A, the No Action Alternative, no new acreage would be added to the Refuge. No public funds would be expended for the purchase of new property or for Refuge operations and maintenance of new property. Additionally, there would be no additional long-term commitments by the Service to recover endangered species in this area.

2.3.2 Alternative B – the Coastal Alternative

Alternative B would entail adding 55 acres of coastal habitat situated geographically adjacent to both the existing Refuge and the Pacific Ocean (see Figure 4). A small portion of the Kilauea River estuary is also included in Alternative B. This alternative includes Parcels 2, 5, and 6 (38 acres of coastal bluff to both the east and west of the existing boundary), Parcel 4 (5 acres of coastal dunes), and Parcel 1 (12 acres of river

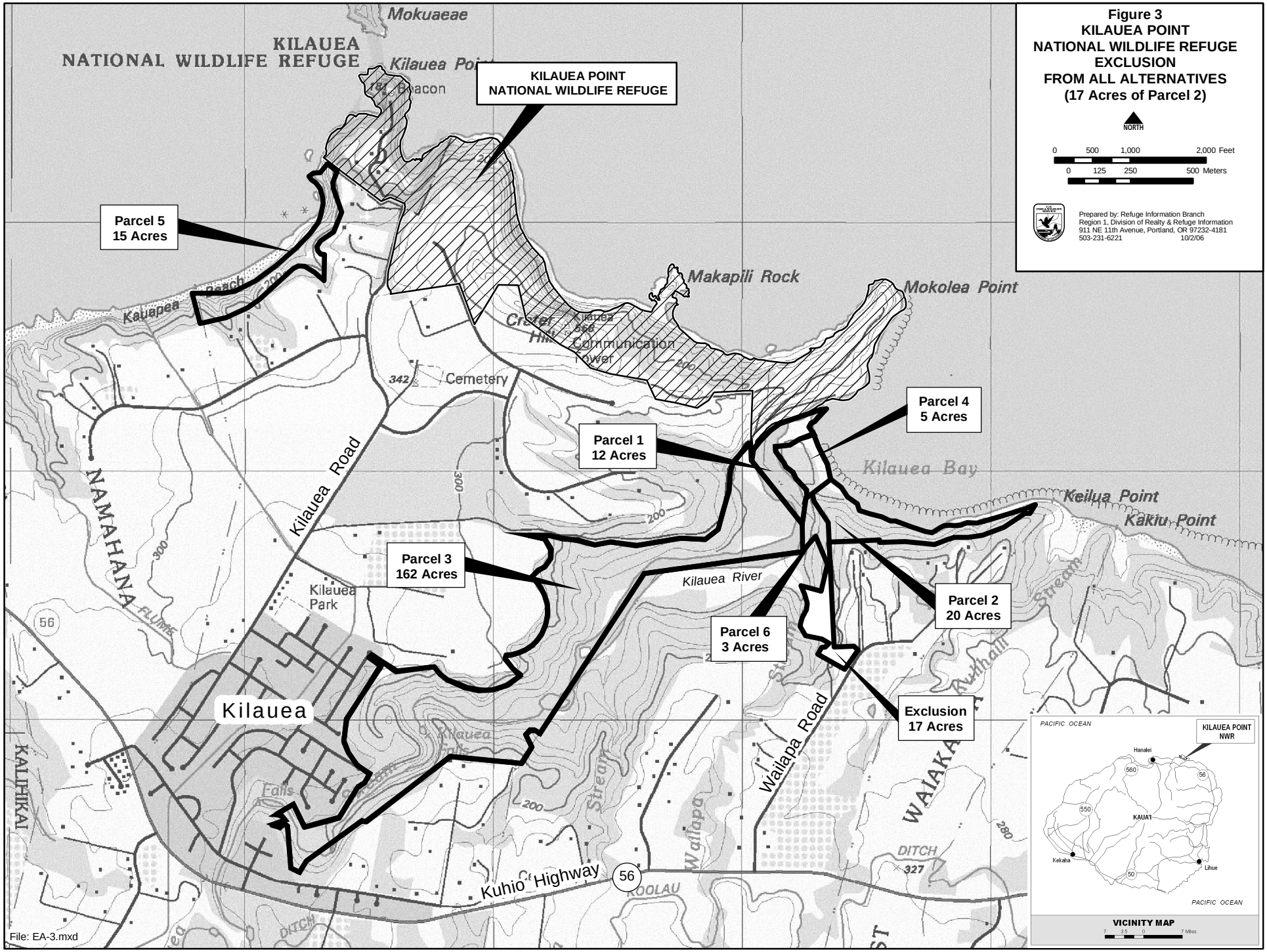
Figure 3
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
EXCLUSION
FROM ALL ALTERNATIVES
(17 Acres of Parcel 2)
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
Parcel 5
15 Acres
Parcel 1
12 Acres
Parcel 4
5 Acres
Parcel 3
162 Acres
Parcel 2
20 Acres
Parcel 6
3 Acres
Exclusion
17 Acres
Mokuaeae
KILAUEA
NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kilauea Bay
Keilua Point
Kakiu Point
Kauepea Beach
Crater Hill
Communication Tower
Cemetery
Kilauea Road
NAMAHANA
Kilauea Park
Kilauea River
Kilauea
Kilauea Falls
Wailapa Road
Wailapa Stream
Ruthall Stream
WAIAKA
DITCH
Kuhio Highway
56
KALIHIKAI
File: EA-3.mxd
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
Kapa'a
560
56
550
KAUA'I
Kekaha
Lihue
50
PACIFIC OCEAN
VICINITY MAP
7 3.5 0 7 Miles

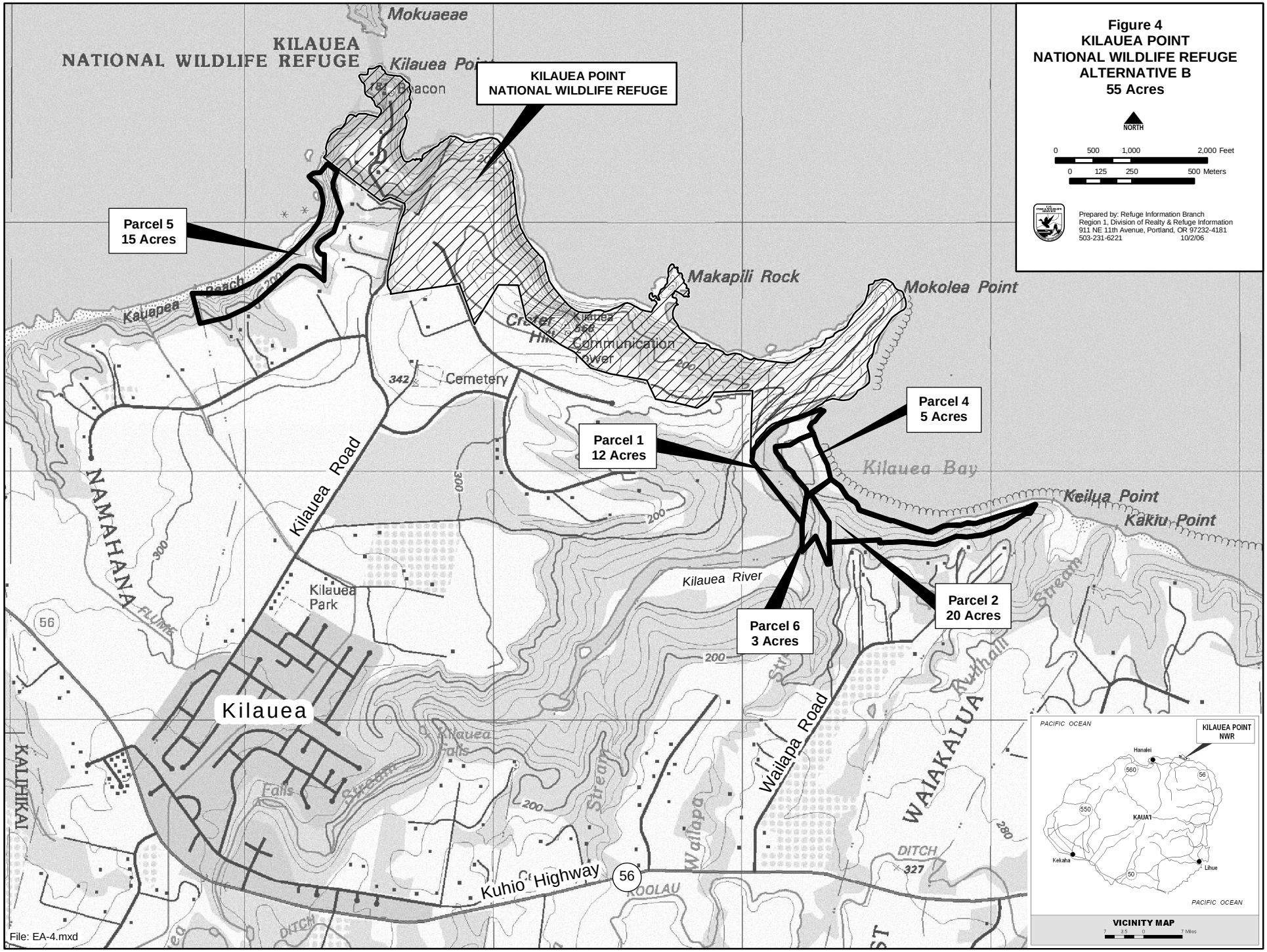
Figure 4
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
ALTERNATIVE B
55 Acres
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
Parcel 5
15 Acres
Parcel 4
5 Acres
Parcel 1
12 Acres
Parcel 2
20 Acres
Parcel 6
3 Acres
Mokuaeae
KILAUEA
NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kilauea Bay
Keilua Point
Kakiu Point
Kalaepea Beach
Crater Hill
Kilauea 556
Communication Tower
Cemetery
342
Kilauea Road
NAMAHANA
FLUME
Kilauea Park
Kilauea River
Kilauea
Kilauea Falls
Falls Stream
Wailapa Road
Wailapa
WAIAKALUA
Ruthall
DITCH
327
280
KALIHIKAI
Kuhio Highway
56
KOOLAU
DITCH
200
300
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
Kapa'a
560
56
550
KAUA'I
Kekaha
Lihue
50
PACIFIC OCEAN
VICINITY MAP
7 3.5 0 7 Miles
File: EA-4.mxd

mouth property and a small portion of river estuary). Under this alternative, the Service would add potentially valuable seabird nesting areas (including the federally-listed threatened Newell's Shearwater), coastal strand dune habitat with high restoration potential, and a small (approximately 1 acre) strip of riparian habitat within Parcel 1 for endangered Hawaiian waterbird foraging, resting, and reproduction. This acreage would be protected and managed in perpetuity as part of the Refuge System.

The coastal bluff and dune habitats that comprise the bulk of Alternative B would provide the Service with the ability to protect and enhance native coastal biological diversity. This alternative would result in the protection and conservation of native Hawaiian seabirds; wintering shorebirds, ruddy turn stones, Pacific golden Plovers, and wandering tattlers on the shoreline; and two species protected under the Endangered Species Act – the endangered Hawaiian monk seal and threatened green sea turtle.

2.3.3 Alternative C – the Riverine Alternative

Under the Riverine Alternative, the Service would expand the Refuge by approximately 179 acres (see Figure 5). Alternative C encompasses lands within the Kilauea River Valley from above the Kilauea Falls to the rivermouth at Kahili Bay (Parcels 1, 3, and 4). Under this alternative, the Service would acquire coastal lowlands that include wetlands, riparian, forest, grassland, marsh, stream, estuary, and dune habitats; some of which are vulnerable to development. This addition would preserve habitat for the four endangered Hawaiian waterbirds, the endangered Nene, and several species of estuary dependent fish, crustaceans, and invertebrates. It would also provide nesting habitat for the White-tailed Tropicbird and native and nonnative lowland forest birds.

Alternative C (Riverine) would primarily, but not exclusively, focus on the recovery of endangered Hawaiian waterbirds and the endangered Nene. Alternative C would protect 179 acres that include important wetlands capable of supporting new populations of endangered species, and grassy hillside that would support nesting by Nene. This alternative includes the protection of important aquatic habitat which would be managed in cooperation with Hawai‘i's Department of Land and Natural Resources.

2.3.4 Alternative D – Coastal and Riverine Alternative - Preferred Alternative

Alternative D is a combination of a portion of Alternative B with Alternative C (see Figure 6). Under Alternative D, the Service would expand the Refuge by 202 acres. This is the Service's preferred alternative.

Under Alternative D, the Service would seek to acquire the following parcels and habitats: 12 acres of coastal river mouth (Parcel 1); 165 acres of brackish and freshwater wetlands, riparian, upland shrub, forest, and portions of the Kilauea River (Parcel 3, 162 acres plus Parcel 6, 3 acres); 5 acres of coastal dune (Parcel 4); and 20 acres of coastal bluff on Parcel 2.

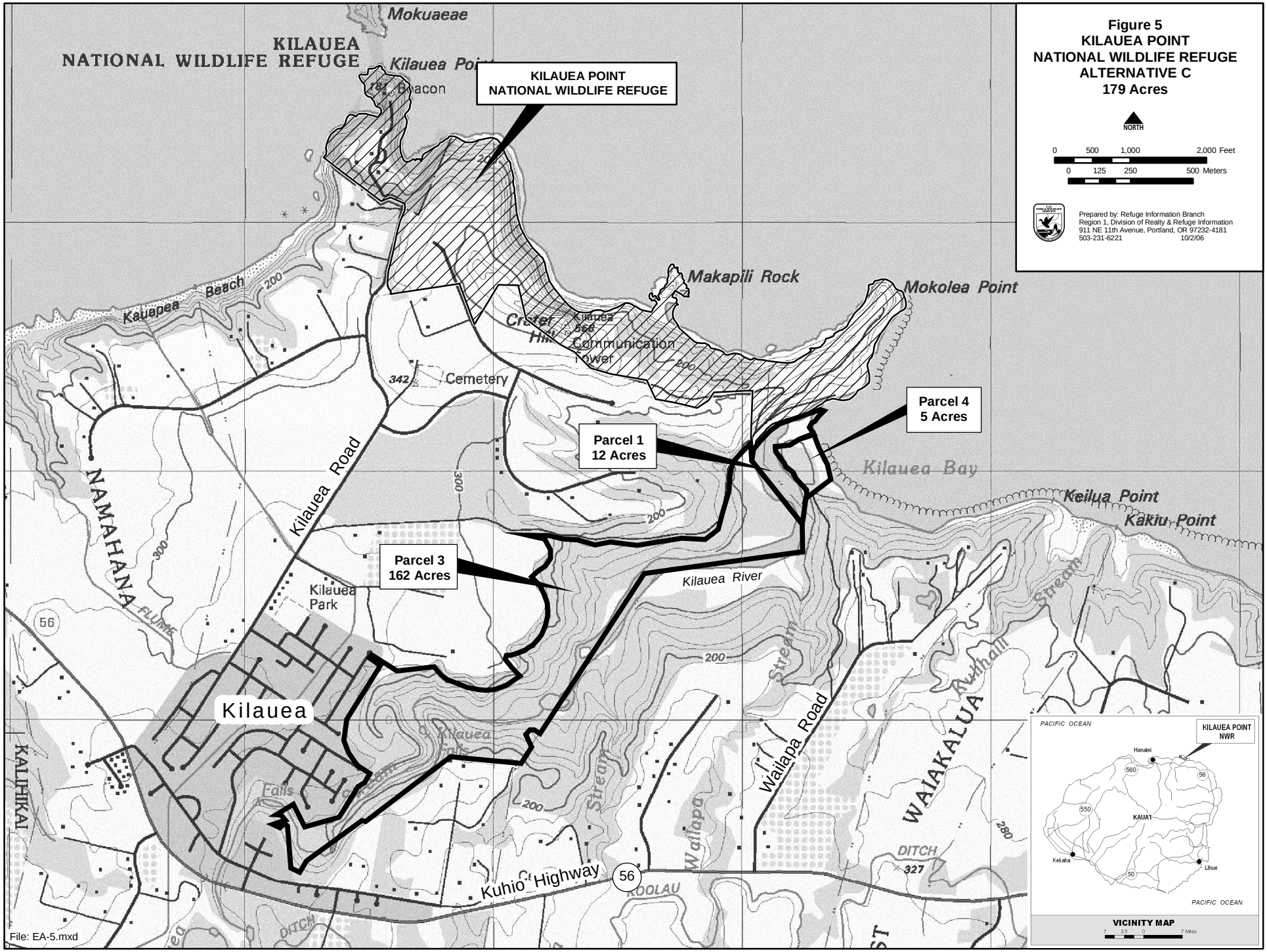
Figure 5
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
ALTERNATIVE C
179 Acres
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT NATIONAL WILDLIFE REFUGE
Parcel 1 12 Acres
Parcel 3 162 Acres
Parcel 4 5 Acres
Mokuaeae
KILAUEA NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kauapea Beach
Crater Hill
Communication Tower
Cemetery
Kilauea Road
NAMAHANA
Kilauea Bay
Keilua Point
Kakiu Point
Kilauea River
Kilauea Park
Kilauea
KALIHIKAI
Wailapa Road
WAIAKALUA
Kuhio Highway
56
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
KAUA'I
Kekaha
Lihue
VICINITY MAP
File: EA-5.mxd

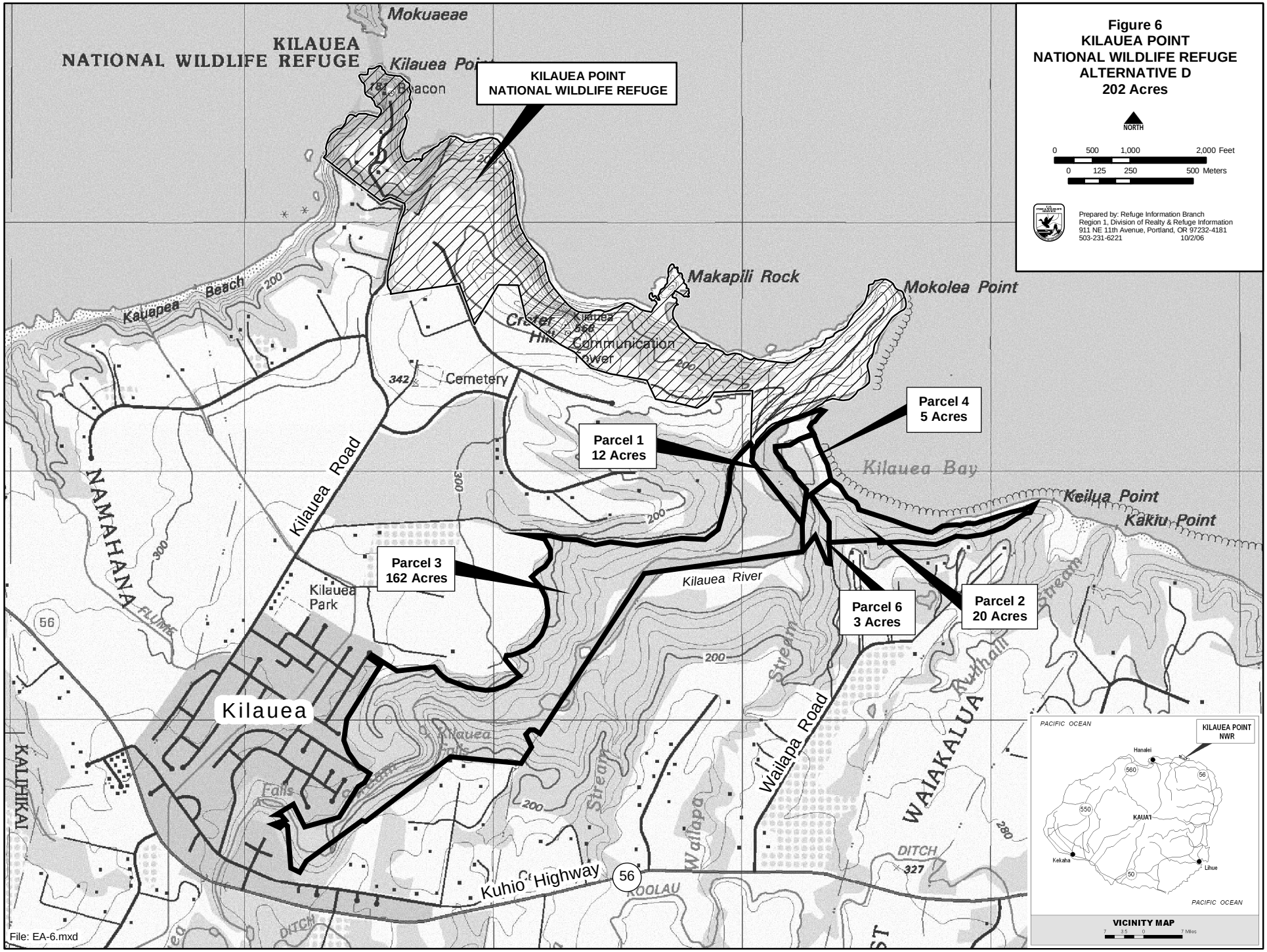
Figure 6
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
ALTERNATIVE D
202 Acres
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, Division of Realty & Refuge Information
911 NE 11th Avenue, Portland, OR 97232-4181
503-231-6221 10/2/06
KILAUEA POINT NATIONAL WILDLIFE REFUGE
Parcel 1 12 Acres
Parcel 2 20 Acres
Parcel 3 162 Acres
Parcel 4 5 Acres
Parcel 6 3 Acres
KILAUEA NATIONAL WILDLIFE REFUGE
Mokuaeae
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kilauea Bay
Keilua Point
Kakiu Point
Kilauea Beach
Crater Hill
Kilauea 556
Communication Tower
Cemetery
342
Kilauea Road
NAMAHANA
FLUME
Kilauea Park
Kilauea River
Kilauea
Kilauea Falls
Falls
Stream
Wailapa Road
Wailapa
WAIAKALUA
Ruthall
DITCH
327
Kuhio Highway
56
KOOLAU
KALIHIKAI
File: EA-6.mxd
PACIFIC OCEAN
KILAUEA POINT NWR
Hanalei
560
56
550
KAUA'I
Kekaha
Lihue
50
PACIFIC OCEAN
VICINITY MAP

Parcel 5 is included in Alternative B, the Coastal Alternative, but not in Alternative D, the Preferred Alternative. Despite its location and current and potential wildlife habitat values, unresolved controversy and legal questions concerning public access through the parcel precluded the Service from including this parcel in the Preferred Alternative.

Under Alternative D, the Service would protect important estuary and wetland environments to aid in the recovery of the endangered Hawaiian Duck, Hawaiian Coot, Hawaiian Moorhen, and Hawaiian Stilt, along with the Nene. With the addition of this property to the Refuge, the Service would protect from development a significant portion of the Kilauea River Valley (habitat for the endangered Hawaiian hoary bat) and, through the upcoming CCP planning process, seek to provide compatible public recreational opportunities.

2.4 Comparative Evaluation of Alternatives

Table 1. Summary Comparison of the Alternatives

Issue	Alternative A No Action	Alternative B Coastal	Alternative C Riverine	Alternative D Riverine and Coastal (Preferred Alternative)
Total future Refuge size:	203 acres.	258 acres.	382 acres.	405 acres.
Additional Acreage:	0 acres. The Refuge would not be expanded.	The Refuge would be expanded by an estimated 55 acres.	The Refuge would be expanded by an estimated 179 acres	The Refuge would be expanded by an estimated 202 acres.
Endangered Species Habitat:	No additional protection. Endangered species management would continue on the Refuge. Endangered waterbirds would not be managed as part of the Refuge.	* Add 38 acres of coastal bluff for potential nesting by the threatened Newell's Shearwater. * Add 6 acres of aquatic and riparian habitat (mostly estuary) for endangered Hawaiian Coot, and Moorhen.	*Add 15 acres of additional managed wetlands for four endangered waterbird species and 30 additional acres for Nene habitat. *Add 30 acres of aquatic and riparian habitat (estuary and stream) for all four endangered waterbirds.	*Add 15 acres of managed wetlands for endangered waterbirds, 30 acres of Nene habitat, 30 acres of aquatic and riparian habitat for four endangered waterbird species, and 20 acres of coastal bluff for potential nesting by threatened Newell's Shearwater. Alternative D. includes coastal dunes and strand habitat for endangered monk seals and threatened green sea turtles.
Cultural Resource Protection:	No cultural sites or resources from the Kilauea River area would be included in the Refuge.	Cultural resources in the dunes and coastal bluff would be included in the Refuge.	Cultural resources in the Kilauea River Valley and in the dunes would be included in the Refuge.	Cultural resources in the dunes, coastal bluffs, and in the Kilauea River Valley would be included in the Refuge.

Issue	Alternative A No Action	Alternative B Coastal	Alternative C Riverine	Alternative D Riverine and Coastal (Preferred Alternative)
Public Access and Recreation: (Existing public access, see Figure 7)	Access to the coast would continue through existing designated legal public access right of ways. Private landowners would continue to control access across and use of private lands.	Access to the coast would continue through existing designated legal public access right of ways. Access to land not included in the Refuge would continue to be controlled by respective landowners. Public access to the Refuge would be through Refuge visitation programs	Access to the coast would continue through existing designated legal public access right of ways. Access to land not included in the Refuge would continue to be controlled by respective landowners. Public access to the Refuge would be through Refuge visitation programs.	Access to the coast would continue through existing designated legal public access right of ways. Access to land not included in the Refuge would continue to be controlled by respective landowners. Public access to the Refuge would be through Refuge visitation programs.
Estimated cost to purchase land:	No public funds expended	Approximately $3,001,500 to purchase land from willing sellers	Approximately $6,001,500 to purchase land from willing sellers	Approximately $9,001,500 to purchase land from willing sellers
Estimated annual operations and maintenance costs:	$0	1 maintenance worker - $60K/yr. Operations/ maint. - $75,000/yr. Total - $135,000	1 maintenance worker - $60K/yr. 1 law enforcement officer - $75K/yr. Operations/maint. - $150,000/yr. Total - $285,000	1 maintenance worker – $60k/yr. 1 law enforcement officer – $75K/yr. Operations/maint. - $200,000/yr. Total - $335,000

2.5 Habitat Protection Methods

A variety of habitat protection methods could be used to conserve fish and wildlife habitat. The actual method selected for any individual parcel will depend on what the landowner and the Service agree upon. If a mutual agreement cannot be reached, the landowner retains full use, control, and responsibility for the property.

Cooperative Agreements – The Service can enter into cooperative agreements with landowners to improve wildlife habitat management. Cooperative agreements may specify shared responsibilities, or a transfer of funds from the Service to another entity or vice-versa for management purposes. Cooperative agreements could be applied to land under any type of ownership in the study area.

Conservation Easements – Conservation easements are a type of acquisition where the landowner permanently transfers some, but not all, property rights to the Service as specified by mutual agreement. Under a conservation easement, a landowner could manage the land for wildlife. The Service can acquire easements through purchase,

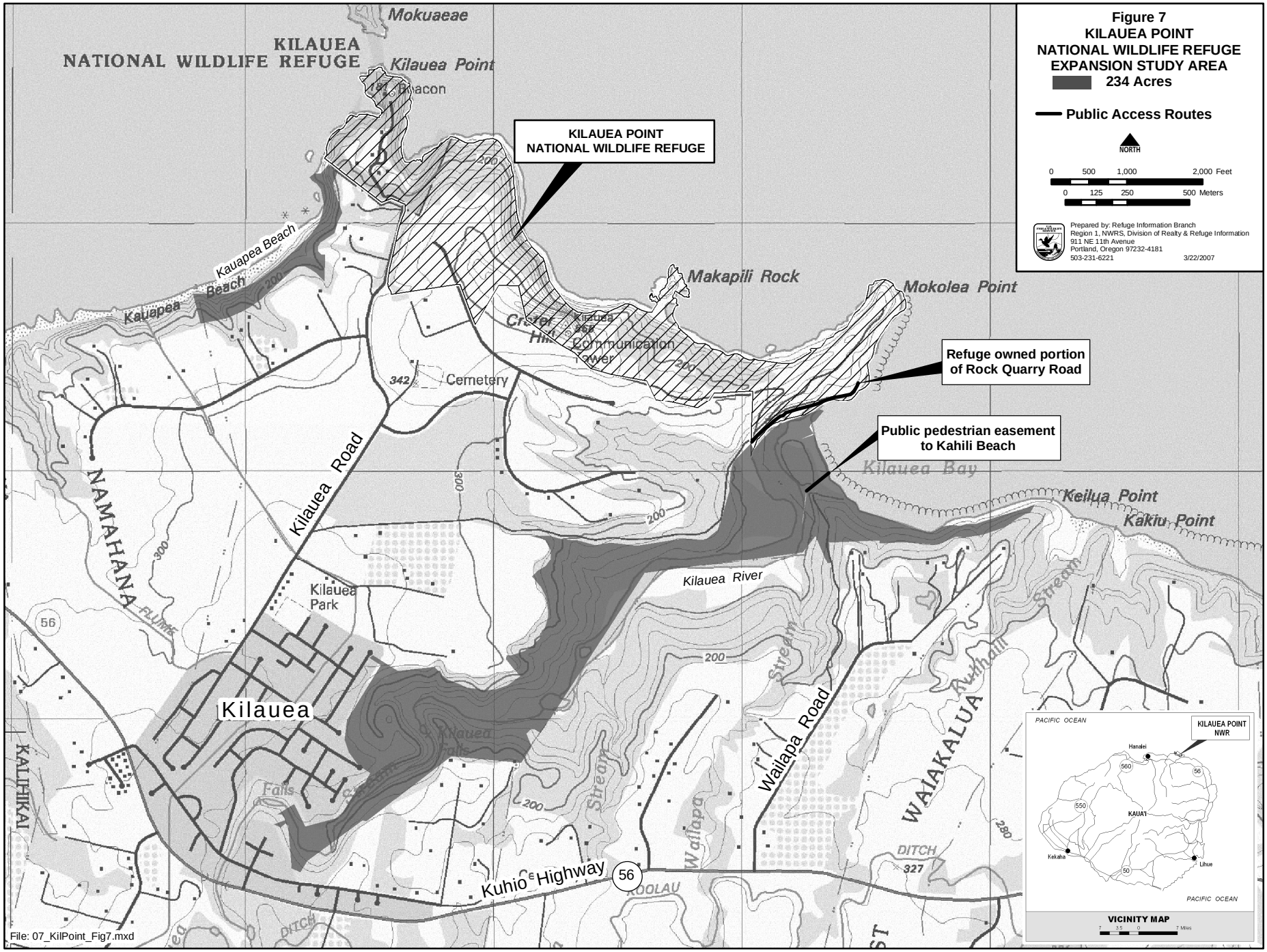
Figure 7
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
EXPANSION STUDY AREA
234 Acres
Public Access Routes
NORTH
0 500 1,000 2,000 Feet
0 125 250 500 Meters
Prepared by: Refuge Information Branch
Region 1, NWRS, Division of Realty & Refuge Information
911 NE 11th Avenue
Portland, Oregon 97232-4181
503-231-6221
3/22/2007
KILAUEA POINT
NATIONAL WILDLIFE REFUGE
Refuge owned portion
of Rock Quarry Road
Public pedestrian easement
to Kahili Beach
Mokuaeae
KILAUEA
NATIONAL WILDLIFE REFUGE
Kilauea Point
Beacon
Makapili Rock
Mokolea Point
Kauapea Beach
Kauapea
Communication
Tower
Cemetery
Kilauea Road
NAMAHANA
Kilauea Bay
Keilua Point
Kakiu Point
Kilauea River
Kilauea
Park
Kilauea
Falls
KALIHIKAI
Wailapa Road
WAIAKALUA
Kuhio Highway
DITCH
PACIFIC OCEAN
KILAUEA POINT
NWR
Hanalei
KAUAI
Kekaha
Lihue
VICINITY MAP
File: 07_KilPoint_Fig7.mxd

donation, or exchange, depending on the terms of the easement. The property owner pays any applicable property taxes.

Fee Title Acquisition – A fee title interest is normally acquired when: (1) the fish and wildlife resources on a piece of property require permanent protection that is not otherwise available; (2) the property is needed for development associated with public use; (3) a pending land use could otherwise harm wildlife habitats; or (4) purchase is the most practical and economical way to assemble small tracts into a manageable unit. Fee title acquisition transfers any property rights owned by the landowner, including mineral and water rights, to the Federal government. A fee title interest may be acquired by purchase, donation, or exchange.

2.6 Land Protection Priorities by Parcel

Of all the parcels being considered for the Refuge addition, Parcel 3 is the Service's highest acquisition priority. This 162-acre parcel contains valuable coastal wetland habitat that is a priority for conservation efforts that will promote recovery of Hawai‘i's endangered waterbird species. Parcel 3 contains the widest variety of valuable wildlife habitat types of the five parcels included in this project.

Parcel 1 is rated second highest in priority because it ranks second in its wildlife habitat value and is situated adjacent to the current boundary and connects the current Refuge acreage with Parcel 4 of this project (a parcel planned for donation to the Refuge).

Table 2. Land Tract and Priority Information

Priority	Tract	Owner	Size	Proposed Method of Protection
#1	Parcel 3 TMK 4-5-2-1-2-35	Kilauea Farms Ranch	162 acres	Acquisition of fee title through purchase from willing seller.
#2	Parcel 1 TMK 4-5-1-05-12	Kaua‘i Public Land Trust	12 acres	Acquisition of fee title through purchase or donation from willing seller.
#3	Parcel 2 TMK 4-5-1-5-0-16	Kilauea Vistas Property	20 acres	Acquisition of fee title through purchase from willing seller.
#4	Parcel 4 TMK 4-5-1-5-0-16	Kaua‘i Public Land Trust	5 acres	Acquisition of fee title through donation by the landowner.
#5	Parcel 6 TMK 4-5-1-5-0-16	Kaua‘i Public Land Trust	3 acres	Cooperative agreement for wildlife management by the refuge.

Parcel 2 is ranked third because of its wildlife habitat value and the fact that a portion of this property is under threat of development. The Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife is currently requesting $3 million from the Recovery Lands Acquisition Program to purchase this property. If acquired by

the State of Hawai‘i, this parcel will be administered by the Department of Land and Natural Resources for wildlife conservation but may become part of the Refuge at a later date.

Parcel 4 and Parcel 6 are ranked fourth and fifth, respectively, because they have already been purchased by the Kaua‘i Public Land Trust for the purpose of conservation with intentions to donate these properties to the Service for inclusion in Refuge.

Parcel 6 (formerly part of Parcel 2) changed ownership in 2006. It was sold by Kilauea Vistas Property to Kilauea Public Land Trust to be managed under cooperative agreement by Kilauea Point National Wildlife Refuge.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Overview of the Study Area

The island of Kaua‘i is one of eight main islands in the Hawaiian Archipelago, located near the middle of the Pacific Ocean, just south of the Tropic of Cancer. The Hawaiian Archipelago is the world’s most isolated group of islands, lying approximately 2,400 miles southwest of San Francisco. Kaua‘i is located on the western end of the main island chain. Its nickname is the “Garden Isle” due to the lush, green environment and high average rainfall.

The Refuge is situated at the most northerly point on the island of Kaua‘i. The majority of the proposed project acreage lies adjacent to the southeastern portion of the Refuge along the Kilauea River estuary. An additional 38 acres of proposed expansion area includes ocean bluff acreage located directly to the east and west of the Refuge.

The study area includes approximately 234 acres of coastal land encompassing 179 acres of the Kilauea River estuary with its associated rivermouth and dune system and 38 acres of coastal bluff located both east and west of the river.

3.2 Physical Environment

This section describes the physical setting including the topography, soils, geology, climate, and hydrology.

3.2.1 Topography

Kaua‘i is a relatively small island with a land area of 553 square miles. It is the fourth largest of the eight main islands of the Hawaiian Archipelago and it is the oldest, at over 5 million years. The island is 32 miles east to west and 22 miles from north to south with a perimeter of 111 miles. The island is characterized as having major topographic features such as the 2.5-mile wide, 13-mile long Waimea Canyon, with depths up to 2,750 feet. Waimea Canyon slopes off to the low-lying western Mana Coastal Plains that are rimmed by 16 miles of contiguous beach. The 14-mile long Na Pali coast displays 1,000- to 3,000-foot sea cliffs.

Mount Kawaikini is the highest point on the island at 5,243 feet above sea level. Nearby Mount Wai‘ale‘ale is the second highest at 5,148 feet above sea level and may be the world’s best rainmaker. A nearly 3,200-foot relief on its windward-facing eastern flank captures the trade wind moisture and produces an annual average rainfall of 430 inches. The Alaka‘i Swamp sits on the Olokele Plateau, near Mount Wai‘ale‘ale, and forms a dense and wet ecosystem at the heart of Kaua‘i’s remaining endemic habitats.

The Kilauea River Valley, located in the northern portion of the island, provides drainage for the nearby mountains, mainly the Kamoʻokoa ridge. The Kilauea River is approximately 4 miles long and is classified as a small river by State standards with average flows of 8.21 cfs (Hawaiʻi Stream Assessment 1990).

3.2.2 Soils

According to *Soils Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii* (August 1972) prepared by the U.S. Department of Agriculture, Soil Conservation Service (now the Natural Resources Conservation Service), the expansion project parcels are described as follows.

Parcel 1 is 12 acres and contains approximately 3 acres of beach sand and loose windblown sand from the nearby beach, derived from coral and seashells. The remaining 9 acres of the property are under the Kilauea River and the soils have not been examined.

Parcels 2 and 5 are 20 and 15 acres, respectively. They are ocean bluffs classified entirely as "rough broken land" containing steep slopes of 40-70 percent. These slopes are broken by numerous intermittent drainage channels, with soils 20-60 inches deep over soft, weathered rock.

Parcel 3 is 162 acres with the vast majority of its soils characterized as rough broken land with slopes less steep than the coastal bluffs but still within the 40-70 percent slope range. Approximately 10 percent of Parcel 3 is alluvial plain near the river's mouth and contains soils of three different classifications. These soils are characterized as Mokuleʻia fine sand loam, Mokuleʻia clay loam, and Lihuʻe silty clay – the last being found near the river's last major bend to the west before it empties into the sea. Approximately 2,000 feet up the west bank from the rivermouth, Hanalei silty clay is present on approximately 1 acre.

Parcel 4 consists of 5 acres divided into two soil types. The first is ocean washed light-colored sand derived from coral and seashells, gravel, and cobble beach. The second is dune land with low mounds, hills, and ridges of loose windblown sand (coral and seashell), actively shifting or stabilized by vegetation.

Parcel 6 is much like the soils of Parcel 3, characterized by rough, steep land broken by numerous drainage channels. Slopes are 40 to 79 percent. The soils are 20 inches to more than 60 inches deep, covering soft weathered rock fragments mixed with the soil material.

3.2.3 Geology

Kauaʻi consists of a single great shield volcano that is deeply eroded and partly veneered with much later volcanic activity. The shield volcano was built by the extrusion of lava of the Waimea Canyon Volcanic Series during the late Pliocene Epoch. Following the cessation of the main volcanic-building event, there was renewed volcanic activity with

the extrusion of the post-erosional Koloa Volcanic Series. Rocks of the Koloa Volcanic Series are generally characterized as thick flows of dense basalt extruded from dozens of vents and are associated with pyroclastic materials that form low cinder cones at the vent (Blay and Siemers 2004).

Located on the north shore, Kilauea Point is a volcanic cone complex that was formed later during the vents of Koloa Volcanics (3.65-0.52 million years ago). Crater Hill is the highest peak, rising 560 feet from sea level. Due to coastal erosion, only about one-third of the Kilauea volcano complex still exists but at one time probably had a diameter of at least 1.2 miles (Blay and Siemers 2004).

3.2.4 Climate

The dominant trade winds come off the Pacific Ocean from the northeast and help moderate the island's temperature extremes. The trade winds occur approximately 70 percent of the year, bringing warm tropical air containing large quantities of moisture to Kaua‘i where they encounter the steep mountainous slopes of Kaua‘i's northern and eastern regions. These moisture-laden trade winds are forced by the topography to rise quickly and cool. Cooler air holds less water vapor therefore condensation occurs in the form of clouds and precipitation begins.

The windward sides (northern and eastern) of Kaua‘i experience heavier rainfall than the relatively dry southern and western (leeward) sides of the island. Average annual rainfall in the town of Waimea is only 12-15 inches, while Kilauea experiences an average of 50-60 inches.

Temperatures during the winter months on Kaua‘i range from 65-81°F (18-27°C). Summer temperatures range from 72-88°F (22-31°C).

3.2.5 Hydrology

The Kilauea River is located in the Hanalei District of the north shore of Kaua‘i. It begins as two main streams coming off the nearby mountain ridge called Kamo‘okoa and from Mount Namahana. These streams are called the Halualani and the Pu‘u Ka Ele streams and converge southwest of the Refuge. In a similar manner on the east side of the Kamo‘okoa Ridge, small streams feed the Pohokuhonu Stream which converges with a portion of the Pu‘u Ka Ele stream.

Approximately 1-mile "mauka" (to the mountain side) of Kuhio Highway, the Halaulani and Pohokuhonu Streams converge to form the Kilauea River that flows under the main highway toward the ocean at Kahili Bay. Two waterfalls exist along the Kilauea River, on the "makai" or ocean side of the highway. The first is called the Slippery Slide and is located about a quarter-mile north of the highway, out of the proposed acquisition area. This waterfall drops approximately 25 feet to a pool below that is a popular recreational attraction. Just downstream of the Slippery Slide, the proposed expansion acreage begins.

Kilauea Falls is one of the widest waterfalls on the island and drops 50 feet to a large pool below. This falls is located a quarter-mile downstream from the Slippery Slide. Below Kilauea Falls, the Kilauea River winds another 1.5 miles until it empties into Kahili Bay at Kahili Beach, also known as Rock Quarry beach.

In addition to the two main streams that converge south of the main highway, the Kaluamakua and Wailapa are relatively small streams that join with Kilauea River from the eastern side. They both originate from near the Ka Loko reservoir, just outside the Moloa‘a Forest Reserve and feed into the river closer to its mouth, on the ocean side of Kuhio highway.

3.3 Social and Economic Setting

In this section, the social and economic setting is described including the local population and visitation in the community, employment and the local economy, and tax revenues.

3.3.1 Population and Local Community

The most recent U.S. Census Bureau census taken in the year 2000 showed a population of 58,463 full-time residents on the island of Kaua‘i, including 2,092 residents in the town of Kilauea.

In 2003-2004, the U.S. Geological Survey (USGS) conducted a community survey of the town of Kilauea in conjunction with the Refuge’s alternative transportation study. There were 431 Kilauea residents, most of whom were full-time residents, who responded to this survey, headed by the Policy Analysis and Science Assistance program (PASA) at the USGS Fort Collins Science Center (Sexton et al 2005) (see Table 3-1). Based on the 2000 census population of 2,092 residents, the response rate was approximately 21 percent. The detailed survey gives us more detail about the makeup of the Kilauea community.

The Refuge, with its beautiful vistas, historical lighthouse, and large seabird nesting colonies, attracts approximately 500,000 visitors per year. According to the PASA community survey, visitors substantially affect the community both positively and negatively. Local residents recognize the Refuge as an important place for people of current and future generations to spend time but residents are also concerned about traffic patterns and the volume of traffic.

Visitors passing through town stop to purchase a range of items including gas, food, and gifts, which helps to support many local businesses. However, the large volume of rental vehicles adds traffic congestion and lowers traffic safety in Kilauea.

Table 3. Demographics of Kilauea Town Residents (n=431 respondents) (Source: USGS 2005).

Demographics	Community Residents
Male	40%
Female	60%
Average Age	50
Worked Full or Part Time	81%
Retired	16%
Highest Education Level	Some college or technical school
Mean Household Income	$50,000 – 74,999 per year
Race	
White	68.2%
American Indian	2.1%
Black or African American	0.7%
Asian	20.50%
Chinese	(3.5%)
Japanese	(7.9%)
Korean	(0%)
Filipino	(7.9%)
Vietnamese	(0%)
Asian Indian	(0%)
Other Asian	(1.2%)
Native Hawaiian/Pacific Islander	8.6%
Years lived on Kaua‘i	22
Generations lived on Kaua‘i	2.1
Years lived in Kilauea	17
Full-time residents	98%
Part-time residents	2%

[1]Race percentages reflect the number of responses not the number of respondents; respondents could check more than one race.

3.3.2 Employment and Local Economy

Table 3-1 illustrates 81 percent of Kilauea residents either work full or part-time and 16 percent are retired. The average annual household income ranged from $50,000-74,999. Many of the local jobs are in businesses that purchase extra labor and supplies to meet the increase in demand for additional services desired by the island’s tourists.

According to the USGS study, the jobs and income generated by the Refuge represents approximately 0.3 percent of the total income and 0.5 percent of the total employment on the island of Kaua‘i. These numbers represent roughly $8.9 million in income and 184 jobs supporting the island of Kaua‘i that are directly attributable to Refuge visitors.

3.3.3 Tax Revenues

The majority of the parcels considered in the Refuge expansion project are lands that are currently zoned either agricultural or conservation and are therefore assessed at $6.95 per $1,000 Net Assessed Valuation (see Table 4).

Table 4. 2006 Tax Rates for the County of Kaua‘i

(Per $1,000 Net Assessed Valuation)	**Building**	**Land**
Homestead	$3.44	$4.00
Single Family Residential	$4.30	$4.00
Apartment	$7.95	$6.95
Commercial	$7.95	$6.95
Industrial	$7.95	$6.95
Agricultural	$4.30	$6.95
Conservation	$4.30	$6.95
Hotel And Resort	$7.95	$6.95

Source: www.kauai.gov (County of Kaua‘i, State of Hawai‘i tax rates)

3.4 Historic and Present Land Use, Development, and Public Use Setting

Historic and present land use, development, and public use are covered in this section.

3.4.1 Historic Use

At the time of Captain Cook’s arrival to the Hawaiian Islands in 1778, Kaua‘i’s lowland ecosystem was significantly altered by well over 1,000 years of Polynesian/ Hawaiian settlement (Kane 1997). The Polynesians are believed to have discovered Hawai‘i during open water exploration from the Marquesas and Tahitian Islands sometime before 1,900 years ago (Kane 1997). The Polynesians brought about 27 species of useful plants to Hawai‘i, which included taro (kalo) (*Colocasia esculenta*) – their most important crop, breadfruit (‘ulu) (*Artocarpus altilis*), ti (ki) (*Cordyline fruticosa*), paper mulberry (wauke) (*Broussonetia papyrifera*), coconut palms (*Cocos nucifera*), sweet potato (‘uala) (*Ipomoea batatas*), yams (uhi) (*Dioscorea spp.*), banana (mai‘a) (*Musa acuminata* hybrids), turmeric (‘olena) (*Curcuma domestica*), sugar cane (ko) (*Saccharum officinarum*), shampoo ginger (‘awapuhi) (*Zingiber zerumbet*), candlenut tree (kukui) (*Aleurites moluccana*), kava (‘awa) (*Piper methysticum*), noni (*Morinda citrifolia*), and other edible and useful plant species. The People of Old (Ka Po‘e Kahiko) as they are sometimes called, preferred to cultivate fertile valleys with permanent water sources, such as the Kilauea River valley. They also used fire to encourage growth of thatching grasses and cut trees for firewood, commerce in sandalwood, and for construction purposes (Kirsh 1982).

Along with plants, the Polynesians brought pigs, dogs, and fowl. These animals, especially pigs, have had a very negative impact on the natural flora and fauna of the Hawaiian Islands. They introduced the relatively small (45 pounds) Polynesian pig (*Sus scrofa*) that was later completely replaced by hybrids of the smaller pig with larger European breeds introduced to the archipelago after Captain Cook's arrival. Feral pigs have direct impacts by destroying understory vegetation, spreading alien weeds, eating ground-nesting birds and eggs (such as seabirds), and creating mosquito-breeding areas from their rooting and wallowing. They consume groundcover plants and significantly contribute to erosion, stream sedimentation, and sediment transfer to the ocean that can smother coral reefs.

Accompanying the intentional introductions came stowaways such as the Polynesian rat (*Rattus exulans*), which did major damage by eating ground-nesting birds and their eggs (Finey 2003); geckos and skinks (families *Geckonidae* and *Scincidae*); land snails (*Lamellaxis gracilis*); and different arthropods such as rat parasites (*Laelaps hawaiiensis*).

In 1826, the Southern house mosquito (*Culex quinquefasciatus*) was introduced to Hawaii from Mexico by the whaling vessel, Wellington, while replenishing their water barrels in freshwater streams on Maui. This introduction has had a devastating effect on endemic bird species by spreading avian malaria and avian pox (Henshaw 1902).

The historic settlement of Kilauea is described in *Kilauea Point Lighthouse: The Landfall Beacon on the Orient Run*. In 1863, Charles Titcomb purchased over 3,000 acres of land in Kilauea from King Kamehameha IV and became one of the first foreigners to own land in the Hawaiian Islands. Charles Titcomb became the founder of the original Kilauea Sugar Plantation Company, where he orchestrated large-scale land clearing for the production of sugar cane. The plantation was in operation until 1971, but only the relatively flat areas went under cultivation. The Kilauea River Valley was not planted with sugar cane, but stone walls found in the valley indicate that taro and possibly rice were grown there in earlier times (Aiken 1988).

3.4.2 Present Land Use, Development, and Public Uses

Limited land use is currently taking place within the 234-acres study area (see Figure 2). Site visits by our staff revealed that there are no residential or commercial structures on any of the parcels. All the parcels except for Parcel 3 (zoned improved residential) are zoned agricultural with portions of Parcels 2 and 3 (the steep slopes) zoned conservation.

Parcel 1 – The Kilauea River mouth parcel is privately owned and undeveloped. Most of the parcel is under water but this tract includes a portion of sandspit at the River mouth that is used by beach goers, picnickers, and occasional illegal campers. The River is frequently used by recreational fishermen, kayakers, and swimmers.

Parcel 2 – This parcel is comprised of steep coastal bluffs. Approximately one acre has been impacted by off-road motorcycle use – an activity that occurs without the

landowner's permission. People also trespass on this parcel to camp. It is common to see transient people camping on the upper elevations of the beaches for an extended time.

Parcel 3 – The property contains no current structures or facilities. Portions of this parcel are mowed. This parcel contains Kilauea Falls, one of the largest waterfalls in the State. Trespassing on this parcel is common. People walk to the Falls and hike on other portions of the parcel to swim in the pool below. A limited number of kayakers (an estimated 5-10 per week) paddle the Kilauea River, with some of these people leaving their boats, where the Kilauea River becomes impassable, and hiking up to the Kilauea Falls, located approximately 1/4-mile upstream. This area is used occasionally with permission of the landowner for commercial video production including commercials and motion pictures.

Numerous foot trails exist through this parcel from various points along the unimproved road to the Kilauea River. People without permission to enter the land often enter the property from above and below the Kilauea Falls.

There are 35 home sites located in the town of Kilauea with property lines that abut Parcel 3. A majority of the private landowners have encroached on this parcel mainly by extending their backyards over time. Some of the encroachment is in the form of mowed grass areas, some encroachment is by the extension of home gardens, some is due to a combination of both mowing and gardening, and another source of encroachment has been through landowners' efforts to create a better view.

A previous landowner had erected a chain-link fence along this property line but, according to residents, the fence did not stand for long. Remnants of the fence can be seen today along the bluff top.

Parcel 4 – No structures or facilities exist on this parcel. This area receives the most public use of all the parcels in the study area. Parcel 4 contains an existing public foot trail easement to the popular Kahili (Rock Quarry) beach. Parcel 4 is comprised of sand dunes mainly covered with invasive nonnative ironwood trees (*Casuarina equisetifolia*) and Christmasberry shrubs (*Schinus terebinthifolius*). Trespass is an issue on Parcel 4. The sand dunes and beaches are illegally used by off-road vehicle enthusiasts who enter the property to ride motorcycles, all-terrain vehicles, and trucks without the landowner's permission. On a regular basis, new vehicle tracks are found throughout the majority of the 5.25-acre parcel despite ongoing efforts by the landowner to construct blockades, post no-trespass signs, and replace vandalized blockades.

Kahili Beach is a popular beach for Kilauea residents and tourists. Surfers, beach-goers, picnickers, etc. access the area by two means. The first access is on the eastern side of Kilauea River, Wilapa Road leads to a County-maintained dirt road that terminates at a small parking lot. A designated County public easement provides foot access between the parking lot and the beach. At times (such as full moons), the dune area is illegally visited by partiers and campers. The second entrance is from the western side of the River on an unimproved road that leads to the beach from the town of Kilauea. Rain will

cause this road to be very slippery and riddled with gullies and potholes. This road is mainly used by resident surfers and anglers as it terminates near a local surf break and coastal fishing area on the Refuge. A terminal portion of this road is within the current Refuge boundary. Both these access points will remain open to the public and neither road is fully contained within the proposed acquisition parcels.

Community stewardship projects are currently in progress on the 5 acres of Kahili dunes (Parcel 4). The Kaua‘i Public Land Trust, in cooperation with the Kilauea Neighborhood Association, currently conducts monthly beach and dune clean-up efforts and has expressed interest in conducting native dune restoration with the Service if this area were to become part of the Refuge System.

Parcel 5 – This 15-acre parcel is located immediately west of the Refuge and consists of steep ocean bluffs. Surfers and beach-goers sometimes cross the parcel to reach the beach below. Transients have been known to illegally camp on the property for extended periods of time. Although some members of the community have expressed their belief that a public access easement (foot trail) to the beach exists across this parcel, this issue remains unresolved between the landowner and the County Planning Department.

Parcel 6 – This parcel is approximately 3 acres, located on the eastern bank of the Kilauea River, and is predominantly covered with thick stands of nonnative hau bush (*Hibiscus tiliaceus*). There are no structures or facilities built on the property. Parcel 6 was recently purchased by the Kilauea Public Land Trust to be transferred to the County of Kauai. The Service hopes to manage this parcel as part of the Refuge under a cooperative agreement with the County of Kauai.

3.5 Archaeological and Historic Resources

In compliance with Section 106 of the National Historic Preservation Act, a records search was conducted at the State of Hawai‘i Historic Preservation Office located in Honolulu in May 2005. The search included a review of all recorded prehistoric and historic archaeological sites within a quarter-mile radius of the proposed expansion area. The file search shows that four cultural resource surveys have been completed within the vicinity of the proposed expansion area. These surveys were conducted in 1996, 1997, 2000, and 2001, resulting in the recordation of nine cultural resources and notation of three sites recorded in 1928 and 1929. Of the 12 cultural resource sites, 1 site, a possible burial, is located within the expansion area. Three sites that are in closest proximity to, but outside of the expansion area, include a historic burial site and agricultural complexes.

3.5.1 Previously Recorded Sites

Previously recorded sites in closest proximity to the expansion area include a historic burial site, agricultural sites, and a heiau, as described below.

The earliest archaeological study was conducted by T.G. Thrum in 1906, it focused on Kaua‘i heiau sites. The Kipapa Heiau, was recorded in 1928-1929 by W.C. Bennett and is described as follows:

> "Kipapa Heiau was situated on the end of the first bluff east of Kilauea River in Kahili section. It was described by Thrum as "A large heiau of some 300 by over 100 feet in size, paved, walls five feet high, standing in cane field in partial ruins." Since that time, stones have been removed." [Bennett 1931]

This site is located outside of the proposed expansion area, to the east. According to information cited from personal communication in the cultural resource survey report by Burgett et al. (2000), the Kipapa Heiau was reportedly destroyed.

Of the four cultural resource survey reports, the survey conducted by Burgett et al. (2000) recorded three sites that are also located outside of, but in close proximity to the proposed expansion area. These sites include:

- A large, pre-contact and early post-contact dryland agricultural site located on the slopes above Kilauea River. Features were studied and described. Based on subsurface testing, no significant cultural deposits were observed, and thus no further work was deemed necessary.

- A possible burial identified by the landowner. The exact location of the site is unknown, but is suggested by the landowner to be located near the base of a slope of a natural bench.

- A late prehistoric/early historic agricultural site consisting of berms separating the remnants of pond fields that were once used for the cultivation of taro and rice. If development is to occur within this site, data recovery (i.e., subsurface auguring) to locate pond field deposits and surface mapping of extant features was recommended.

A preliminary records search by the State Historic Preservation Officer (SHPO) found no sites currently listed in the National Register of Historic Sites in the project area.

A site visit was conducted with the SHPO on May 11, 2005, on Parcel 3. According to the SHPO, very little is known about the historical uses of this parcel. No extensive archaeological surveys have been conducted in the study area because extensive development has never been proposed.

One house site and adjacent taro lo‘i terraces were identified in a lowland portion of Parcel 3. An associated ditch may be present but no clear rock lining of a ditch was observed. Other lo‘i terraces most likely exist at higher elevations in the large valley on the southwestern end of the parcel, but no surveys have been performed to confirm.

3.5.2 Archaeological and Historical Resources Preservation Recommendations

Given that the proposed 234 acres of expansion area contain strata considered to have a high probability for locating cultural resources, it is recommended that an extensive field survey be completed by a professional archaeologist. All newly recorded significant sites would be protected through avoidance measures and/or preservation plans.

3.6 Biological Resources

This section describes the biological resources associated with the project.

3.6.1 Natural Communities

The ecology of Kaua‘i’s lowlands has been severely altered. The massive biotic transformation is apparent from the general lack of native plants and animals and the predominance of exotics in nearly all low-elevation areas except for a few relatively undisturbed beach strands. The proposed expansion area is no exception. The intentional and accidental introduction of alien plants and animals to Kaua‘i has been ongoing for over 1,000 years. Significant changes occurred from Polynesian settlement, but since the arrival of Europeans an estimated 12,000 plant species have been introduced to the Hawaiian Islands, compared with the 27 or so that the Polynesians brought with them. A botanical survey conducted in the Kilauea River Valley in 2005 identified 42 species of nonnative plants and 1 native species.

Currently, feral and nonferal dogs and cats are having a highly negative impact on native ground-nesting birds throughout the island. The staff at the Refuge has documented numerous incidents of seabird and Nene kills that appear to be from both domestic dogs and feral cats.

Accompanying the intentional faunal introductions were accidental species introductions such as the Polynesian rat, which due to its high reproductive rate, had a devastating effect on ground-nesting birds, native land snails, and some tree species (Burney 2001). Other stowaways included the black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), various geckos and skinks, land snails, various arthropods such as rat parasites, and mosquitoes (genus *Culex, Aedes,* and *Wyeomyia*). The introduction of avian malaria from mosquitoes has had an enormous detrimental impact on the Hawaiian endemic bird populations.

It is in this context of “highly disturbed” that one must view the “natural” communities of the Kilauea River Valley and the other parcels in this proposed project area. The study area consists of six parcels containing habitats of the following types: sea bluffs, coastal dunes, tidally influenced riverine estuary, aquatic, riparian, and lowland forest.

The sea bluffs are vegetated with mostly exotic plants, which include grasses, various weedy plants and trees such as false kamani (*Terminalia catappa*), coconut palms, and

ironwood. Native vegetation includes hala (*Pandanus* spp.), ‘akoko (*Chamaeyce celastroides*), and scattered milo trees (*Thespesia populnea*).

These sea bluffs were probably once used by nesting seabirds, but human-related disturbance and the overgrowth of invasive vegetation have rendered these bluffs relatively unusable as nesting habitat.

Cliff face seeps (a type of microhabitat where water seeps from the cliff) are home to sedges, crustaceans, and damselflies that are all endemic to this part of Kaua‘i.

The coastal dunes are vegetated with exotic ironwood trees, Christmasberry, and hau bush, but also have some native species coverage by milo, kou (*Cordia subcordata*), and pohuehue (beach morning glory) (*Ipomoea pescaprae*).

The riverine estuary habitat is covered almost exclusively by exotics; predominantly hau bush, Java plum (*Syzgium cumini*), avocado (*Persea americana*), mango (*Mangifera indica*), bulrush (*Scirpus* spp.), and many species of invasive grasses – mainly California grass (*Brachiaria mutica*).

The lowland forest is heavily dominated by invasive plant species. A recent botanical survey documented 47 nonnative species and 1 native species (See Appendix B). The dominant types of invasive plants are Java plum, Christmasberry, rose apple (*Syzygium jambos*), African tulip (*Spathodea campanulata*), four or five varieties of bamboo (*Bambusa* spp.), and avocado.

The native aquatic resources of the Kilauea River appear to be more intact than the terrestrial environment. The River supports a variety of native creatures such as fish, mollusks, and shrimp. Five species of native gobies are found here, they are: ‘o‘opu nakea (*Awaous guamensis*) which migrates through the area to spawn just above the Kilauea estuary, ‘o‘opu naniha (*Stenogobius genivitattus*), and the sleeper ‘o‘opu akupa (*Eleotris sandwichensis*) both of which are residents of the estuary and also spawn there. The gobies ‘o‘opu nopili (*Sicyopterus stimpsoni*) and ‘o‘opu alamo‘o (*Lentipes concolor*) are known to migrate through the estuary.

These ‘o‘opu species evolved from saltwater ancestors in the goby family. Although they live mainly in freshwater streams as adults, their fertilized eggs wash downstream, and young ‘o‘opu must spend the first several months of their lives in the ocean. Because of their need to migrate upstream, their pelvic fins are fused together to form a suction cup which helps them fasten to rocks, the stream bottom, and even climb waterfalls.

The Kilauea estuary serves as a juvenile nursery ground for commercially important fish such as striped mullet (‘ama‘ama) (*Mugil cephalus*), bonefish (‘o‘io) (*Albula vulpes*), milk fish (‘ama) (*Chanos chanos*), and jack (papi‘o) (*Caranx spp.*). It also supports freshwater prawn ‘opae‘oeha‘a (*Macrobrachium grandimanus*), that live most of their life cycle in the estuary and shrimp ‘opae kala‘ole (*Atyoida bisulcata*), which migrate

through to freshwater. The freshwater mussel hihiwai (*Neritina granosa*) and the snail hapawai (*Neritina vespertina*) are also found in the Kilauea estuary.

The Kilauea River is also home to various nonnative fish species such as koi, goldfish, swordtail, large- and small- mouthed bass, and tilapia.

3.6.2 Endangered Species

Hawaiian Duck – (Koloa) (*Anas wyvilliana*)
The Koloa is a federally-listed endangered species endemic to the Hawaiian Islands and is closely related to the Mallard (*Anas platyrhynchos)*. Hawaiian ducks breed year-round, but mainly from March through June (Engilis 2002). In Kaua‘i lowlands, these ducks form pair bonds between November and May, and then disperse to a variety of nesting habitats ranging from montane streams to lowland wetlands, such as the Hanalei National Wildlife Refuge. They nest on the ground, near water, with a clutch size ranging from 2-10 eggs that are incubated for approximately 30 days. Most clutches are hatched from April to June (USFWS 2005).

Koloa historically use a wide variety of natural wetland habitats for nesting and feeding, including freshwater marshes, flooded grasslands, coastal ponds, streams, riverine pools, and forest swamplands. Artificial wetlands such as taro patches supplement natural habitats and can provide feeding opportunity for the Hawaiian Duck in the absence of human disturbance. Koloa are highly susceptible to human disturbance and will not tolerate human presence in close proximity, or even within the same wetland or field.

Hawaiian Ducks exhibit interisland movement but dispersal tendencies are still unclear (Engilis 2002). They are opportunistic feeders and consume snails, insect larvae, earthworms, tadpoles, grass seed, green algae, and parts of wetland plants, seeds and leaves (Swedberg 1967). Feeding in wetlands and streams typically occurs in water less than 9 inches deep (Engilis 2002).

The current Koloa population estimate is 2,000 on Kaua‘i and Ni‘ihau with approximately 2,500 total in the Hawaiian Islands (Engilis 2005). Accurate population estimates are difficult for this species because it is estimated that 90 percent of Kaua‘i’s population has been displaced to the remaining undisturbed habitat – along extensive upland stream systems between 1,000 and 4,000 feet, the elevations of making everything but helicopter surveys impractical.

The primary cause for the historical decline in Koloa numbers is loss of wetland habitat and illegal hunting. Other factors include predation by introduced animals (e.g., rats, dogs, cats), hybridization (mating with other duck species), and invasion of wetlands by alien plants, disease, and sometimes environmental contamination. Currently the major limiting factors affecting the recovery of this species are loss of habitat and hybridization with feral Mallards (USFWS 2005).

Hawaiian Ducks have been observed on numerous occasions along the Kilauea River, within the proposed acquisition area.

Hawaiian Coot - (‘Alae ‘ke‘oke‘o) (*Fulica alai*)
The Hawaiian Coot is a federally-listed endangered species endemic to the Hawaiian Islands. It was once considered a subspecies of the American Coot (*Fulica americana*) but is now regarded as a distinct species (AOU 1993). It is considered nonmigratory and presumably originated from stray migrants from continental North America (Brisbin et al. 2002). It usually has a completely white frontal shield above the bill that is distinctly larger than that of the American coot but a small percentage have maroon frontal shields.

Hawaiian Coots nest on open fresh water and brackish ponds, taro ponds, shallow reservoirs, irrigation ditches, and in small openings of marsh vegetation (Shallenberger 1977). They construct floating nests of aquatic vegetation from buoyant stems. Nesting occurs primarily from March through September. Water levels are critical for nest initiation and success. Weedy taro ponds may provide good nesting habitat because they are shallow and have limited water fluctuation compared to other sites (VanderWerf 2005). Clutch size ranges from 3-10 eggs with an incubation period of about 25 days (Shallenberger 1977).

Coots are generalist feeders, obtaining food near the surface of the water, diving, or foraging in mud or sand. They also graze on upland grassy sites. Food items include seeds and leaves of aquatic plants, various invertebrates including snails, crustaceans, and aquatic or terrestrial insects, tadpoles, and small fish (Schwartz and Schwartz 1949).

Over the last five years, Statewide data shows the coot population on Kaua‘i as having averaged 2,100 birds, fluctuating between 1,500 and 3,000 birds with some of this variation due to dispersal to Ni‘ihau in wet years (USFWS 2005). Hawaiian coots are common at the Hanalei National Wildlife Refuge.

Hawaiian Coots have been observed in the Kilauea River and estuary on numerous occasions (Zaun 2005).

Hawaiian Gallinule or Moorhen (‘Alae ‘ula) (*Gallinula chloropus sandicensis*)
The Hawaiian Moorhen is a federally-listed threatened endemic subspecies of the Common Moorhen (AOU 1998). This subspecies is nonmigratory and presumably originated from stray migrant birds from continental North America (Nagata 1983). There is no evident plumage, soft body coloration, or measurement differences from forms in North America. They resemble the Hawaiian Coot, but are noticeably smaller, possess a red shield over their red and yellow bill, and have a white flank stripe (Schwartz and Schwartz 1949).

The Hawaiian Moorhen is territorial with territory size ranging from 9,182 to 26,006 sq. feet (Smith and Polhemus 2003). Nesting occurs year-round but most activity occurs from March through August and is influenced by water levels and vegetation growth (Shallenberger 1977). Most nests are built inconspicuously within dense emergent

vegetation over shallow water, generally less than 24 inches deep. Nests are constructed of floating wetland vegetation folded over into a platform nest (Shallenberger 1977). Clutch size averages 4.9 eggs on Kaua‘i (n=87 nests) (Chang 1990) and incubation periods range from 19-22 days. Chicks are able to walk and swim soon after birth but are dependent on the parents for several weeks (Byrd and Zeillemaker 1981).

Moorhens are secretive and prefer foraging in dense emergent vegetation. They are good swimmers and often cross open water to reach foraging sites. Their food items consist of algae, aquatic insects, and mollusks (Schwartz and Schwartz 1949). Grass seeds, various plant parts, and other invertebrates are probably included in the Moorhen’s diet.

The population estimate for this subspecies is nebulous due to their highly secretive behavior and the inaccuracy of current survey methodology: more time-intensive point counts are needed to accurately assess the population (Chang 1990). The average Moorhen count on Kaua‘i over the last 5 years has been 314 birds (HDLNR 1976-2003).

The Moorhen is known to use the Kilauea River in low numbers, with winter adult population counts ranging from 3-6 individuals over the last 5 years (USFWS 2005).

Hawaiian Stilts (Ae‘o) (*Himantopus mexicanus knudseni*)
The Hawaiian Stilt is a distinct subspecies (AOU 1998) of stilt that is part of a superspecies complex of four other stilts (Robinson 1999). It is a slender black and white wading bird with distinctive long, pink legs. It is distinctive from its North American cousins by having black extending lower on the forehead was well as around to the sides of the neck, and it exhibits a longer bill, tarsus (lower leg), and tail (Coleman 1981; Robinson 1999).

Stilt nesting season normally extends from mid-February through August, but varies among years, perhaps depending on water levels (USFWS 2005). Stilts usually lay 3-4 eggs that are incubated for approximately 24 days (Chang 1990). Chicks leave the nest within 24 hours of hatching and may remain with the parents for several months (Coleman 1981).

Hawaiian Stilts use a variety of aquatic habitats but are limited by water depth and vegetation cover. Stilts require early successional marshlands with water depths less than 9 inches and favor exposed tidal flats or perennial vegetation that is limited and low growing such as nonnative grasses (USFWS 2005).

Feeding typically occurs in shallow flooded wetlands with water depths of 5 inches or less for optimal foraging. They eat a wide variety of invertebrates and other aquatic organisms such as water boatmen, beetles, brine fly larvae, polychaete worms, small crabs, fish, and tadpoles (Shallenberger 1977).

Current statewide population estimates of the Hawaiian Stilts are approximately 1,350 (HDLNR 1976-2003). The current census methods appear to provide accurate counts of stilts at each site (Chang 1990). The Hawaiian Stilt has not been recently observed on

any of the parcels within this expansion project area. Suitable nesting and foraging habitat is most likely not currently available; however, with proposed wetland development and management regimens, suitable habitat would be available.

The conservation goal of achieving long-term survival and recovery (and delisting from the Federal endangered species list) would be accomplished by maintaining minimum population numbers and self-sustaining breeding populations at multiple sites on multiple islands. All four species of waterbirds would most likely benefit from the addition of this federally protected and managed wetland to the Refuge. Water levels and vegetative cover can be manipulated in a manner to provide optimal conditions for feeding and nesting for each of the four Hawaiian waterbirds. In addition, protection of this area from threats such as predators and habitat destruction will aid in the recovery of these endangered species.

Hawaiian Goose (Nene) (*Branta sandvicensis*)
The Nene was listed by the Service as an endangered species in 1967 and had been extirpated from Kaua‘i due to habitat loss, illegal hunting, and predation by alien mammals. Nenes, once numbering fewer than 50 birds, have recovered to a population of approximately 1,300 today. They were reintroduced to Kaua‘i in 1991 with the aid of a State-sponsored captive propagation program. The first of three releases occurred on the Refuge in 1991. By 1994, 38 Nene had been released on the Refuge. The Refuge was the chosen reintroduction site because it is fenced with predator proof fencing and maintains an active predator control program.

Currently, the Refuge hosts about one-fourth of the world’s population of Nene, and the population at the Refuge is over ten-fold what it was in 1994. Additional high quality Nene habitat is required to allow these birds to disperse from the existing Refuge boundary.

This expansion project proposes to implement Refuge management activities to enhance Nene habitat, control invasive species, and minimize human-related disturbances by providing an additional 15-30 acres of suitable Nene foraging, roosting, and nesting sites to assist in Nene recovery.

Newell’s Shearwater (‘A‘o) (*Puffinus auricularis newelli*)
Endemic to the Hawaiian Islands, the Newell’s Shearwater breeds on the islands of Kaua‘i, Hawai‘i, and Moloka‘i. Newell’s Shearwater is a federally-listed threatened seabird species. It may be found in the open tropical seas and offshore waters near their island breeding grounds from April through November. It nests in excavated burrows on steep forested mountain slopes but at least two nests have been successfully established on the Refuge (Byrd 1984).

Hawaiian Hoary Bat (‘Ope‘ape‘a) (*Lasiurus cinereus semotus*)
The Hawaiian hoary bat is considered an endemic subspecies and is federally-listed as endangered. Their population status is not well understood but they are frequently observed on Kaua‘i. Hoary bats roost in the foliage of trees. They leave the roost around

dusk, moving to foraging sites in search of flying insects. Bats are most often seen foraging in open areas, near edges of native forests, and over open water and bays. Hawaiian hoary bats often give birth to twins (Beletsky 2000). Threats to this bat include habitat destruction, direct and indirect effects of pesticides, introduced insects, and disease. The Hawaiian hoary bat is the only existing native terrestrial mammal known from the Hawaiian Archipelago. It has been seen in the project area of Kilauea and quite likely uses the Kilauea River estuary and associated areas for foraging and roosting.

3.6.3 Other Species

The Laysan Albatross, a Service Bird of Conservation Concern species, only began to recolonize Kaua‘i in the 1970s and have had remarkable success on the Refuge. Each year, 75-80 nesting pairs come to the Refuge to raise their young. These birds attempt to nest at a few other locations along the north shore of Kaua‘i but have limited success due to attacks by dogs and other human related problems. The Refuge works cooperatively with the U.S. Navy in attempts to relocate Laysan Albatross from the Pacific Missile Range Facility to the Refuge in order to reduce collisions with Navy aircraft and increase the Laysan Albatross population.

Proposed habitat restoration and management for Nene in the Kilauea valley would benefit Laysan Albatross by providing additional grasslands suitable for nesting.

Other native seabirds found in the area include the Red-tailed Tropicbird (Koa‘e ‘ula), White-tailed Tropicbird (Koa‘e kea), Wedge-tailed Shearwater (‘Ua‘u kani), Bulwer’s Petrel (‘Ou) (*Buleria bulwerii*), Great Frigatebird (‘Iwa) (*Fregata minor*), Red-footed Booby (‘A), and Brown Booby (‘A) (*Sula leucogaster*). Boobies are commonly seen in Kahili Bay and sometimes fish in the estuary. The upper canyon walls of the Kilauea River Valley may provide crevices for nesting White-tailed Tropicbirds which have been observed flying along these cliffs and entering crevices during the nesting season.

Shorebirds that are relatively common in the area during the non-breeding season include the Pacific Golden-Plover (Kolea) (*Pluvialis fulva*), Wandering Tattler (‘Ulili) (*Heteroscelus incanus*), Ruddy Turnstone (‘Akekeke) (*Arenaria interpres*), and Sanderling (Hunakai) (*Calidris alba*).

Black-crowned Night Herons (‘Auku‘u) (*Nycticorax nycticorax*) are often seen in the marsh and stream, along with the common, nonnative Cattle Egret (*Bubulcus ibis*).

Migratory waterfowl have not been observed using the Kilauea River but it is expected that occasional visitors such as Mallard, Green-winged Teal (*Anas crecca*), Scaup (*Anthya spp.*), Ring-necked Duck (*Anthya collaris*), or Northern Pintail (Koloa mapu) (*Anas acuta*) would use the estuary.

Raptors species that are common to the area are the Hawaiian Owl (Pueo) (*Asio flammeus sandwichensis*) and the nonnative Barn Owl (*Tyto alba*). An occasional Peregrine Falcon (*Falco peregrinus*) has been sighted in the Kilauea Valley.

The most common nonnative bird species include: Red Junglefowl (*Gallus gallus*), Cattle Egret, Barn Owl, Common Myna (*Acridotheres tristis*), Ring-necked Pheasant (*Phasianus colchicus*), Western Meadowlark (*Sturnella neglecta*), White-rumped Shama (*Copsychus malabaricus*), Japanese Bush-warbler (*Cettia diphone*), Japanese White-eye (*Zosterops japonicus*), Melodious Laughing-thrush (*Garrulax canorus*), Spotted Dove (*Streptopelia chinensis*), Zebra Dove (*Geopelia striata*), Northern Mockingbird (*Mimus polyglottos*), Northern Cardinal (*Cardinalis cardinalis*), Red-crested Cardinal (*Paroaria coronata*), Red-whiskered Bulbul (*Pycnonotus jocosus*), House Sparrow (*Passer domesticus*), Java Sparrow (*Padda oryzivora*), Chestnut Mannikin (*Lonchura malacca*), and Nutmeg Mannikin (*Lonchura punctulata*).

Nonnative rodents include three species of rats (*Rattus spp.*): Polynesian rat, black rat, Norway rat; and the house mouse.

Introduced amphibians and reptiles include the cane toad (*Bufo marinus*), bullfrog (*Rana catesbeiana*), green anole (*Anolis carolinenis*), brown anole (*Anolis sagrei*), snake-eyed skink (*Cryptoblepharus poecilopleurus*), metallic skink (*Lampropholis delicata*), moth skink (*Lipinia noctua*), morning gecko (*Lepidodactylus lugubris*), stump-toed gecko (*Gehyra mutilata*), tree gecko (*Hemiphyllodactylus typus*), Indo-Pacific gecko (*Hemidactylus garnotii*), and the house gecko (*Hemidactylus frenatus*).

Feral pigs (*Sus scrofa*) and feral cats (*Felis domesticus*) are present in the area along with uncontrolled domestic dogs (*Canis domesticus*) that commonly enter the project area.

CHAPTER 4. CONCEPTUAL MANAGEMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter assesses the environmental effects that would be expected to occur with the implementation of each proposed alternative. A summary of the consequences of all four alternatives is presented in Table 4-1. The consequences of two alternatives – the No Action and the Preferred Alternative (Alternative D) – are described in the narrative using biological, social, and economic factors relevant to the issues described throughout this document. Since the same habitat types in Alternatives B and C are also within Alternative D, the Service relies on the analysis for Alternative D to evaluate the significance of effects of implementing Alternatives B and C.

Included in this chapter are brief discussions of conceptual management actions. These conceptual management actions are presented to give the reader an idea of the types of management actions that may be employed by the Service should certain habitat types be acquired and managed as part of the Refuge.

4.1 Alternative A (No Action)

The physical, biological, social, and economic consequences of not adding new land to the Refuge are described in this section.

4.1.1 Effects on the Physical Environment

The climatic, soil, and hydrological effects of not adding new land to the Refuge are discussed below.

4.1.1.1 Climate and Soils

Under Alternative A, development is expected to occur at a low enough density that minimal adverse effects on climate and soils are anticipated. A relatively small degree of soil erosion is expected as vegetation cover is removed at building sites.

4.1.1.2 Hydrology and Water Resources

The No Action Alternative would most likely result in river sedimentation due to soil erosion from anticipated building sites. The steepness of the river valley suggests that soil runoff is likely unless stringent controls are employed. Best management practices are required for construction projects, so sedimentation is not expected to be significant under Alternative A.

Native aquatic biota may be negatively affected by the development of additional homes. Increased fertilizer, pesticide, and household chemical use runoff has the potential to adversely affect water quality in the Kilauea River. However, non-point source pollution controls could be limited if residents minimize these inputs.

4.1.2 Effects on the Biological Environment

Under Alternative A, habitats that currently support limited numbers of native endangered species such as the Hawaiian Coot, Moorhen, and Goose would likely remain in private ownership. These lands in private ownership may receive varying degrees of protection but the largest tract within the study area (162 acres, Parcel 3) is currently being considered for development. Loss and degradation of habitat due to development is a likely result of this alternative. Illegal off-road vehicle use and camping would likely continue to negatively impact wildlife habitat in the area.

Secondary effects of the No Action Alternative may include the following effects on native species from future development: (1) increased predation on native wildlife due to the lack of active predator control; (2) increased water pollution from septic leach field run off, and increased water pollution from fertilizer and pesticide runoff to the river and associated bay; and (3) increased human disturbance to wildlife due to normal homeowner activities and their pets.

4.1.3 Effects on the Social and Economic Environment

Under Alternative A, there would be no change to current public use and public access. Cultural resources would continue to be located on private lands and vulnerable to harm from development or other activities. It is unlikely there would be public access established to Kilauea Falls. Public hiking, kayaking, fishing, photography, and wildlife observation within this project area would likely continue to be prohibited.

No additional ecotourism and associated economic activity is likely to result from this alternative. Vehicular traffic would not be increased by this alternative.

4.2 Alternative D – the Preferred Alternative

Described in this section are the physical, biological, social, and economic consequences of adding 202 acres to the Refuge.

4.2.1 Effects on the Physical Environment

The climatic, soil, and hydrological effects of adding 202 acres to the Refuge are discussed below.

4.2.1.1 Climate and Soils

Habitat management actions under Alternative D that might be considered include removal of invasive plants and animals, and where possible, restore or enhance native wildlife habitat. Thus, implementation of Alternative D would likely result in long-term maintenance of the vegetative cover and minimal soil disturbance which would conserve local micro-climate patterns and soil processes.

4.2.1.2 Hydrology and Water Resources

Implementing Alternative D would provide opportunities for native habitat restoration. Habitat restoration would be expected to maintain and/or improve water quality in the Kilauea River. Conceptual management actions would be to restore up to 15 acres of wetlands which would improve the natural flood control and filtration ability of the project area. Irrigation for these restored wetlands would minimally alter the River flow and drainage of the project area and would be conducted in a manner to minimize sediment transfer due to very low exit speeds. Best management practices would be used to minimize sedimentation and to comply with all State and Federal regulations to protect water quality.

4.2.2 Effects on the Biological Environment

This section covers the potential effects of implementing Alternative D on endangered species, other native species, species' habitats, and open space.

4.2.2.1 Threatened and Endangered Species

Implementation of Alternative D (expansion by 202 acres) would have a modest positive impact on endangered species due to acquisition, development, and management of wetlands, uplands, and coastal habitats. Refuge expansion would protect important wetlands for endangered waterbirds and provide additional habitat for the endangered Hawaiian Goose. It could also make it possible in the future for the Service to consider enhancing nesting areas for the endangered Newell's Shearwater and nesting and loafing areas for threatened sea turtles as well as creating additional haul-out and pupping areas for the endangered Hawaiian monk seal. Habitat protection would conserve roosting areas for the Hawaiian hoary bat. The protection of these endangered species and their habitat would likely be beneficial but not significant, resulting in maintaining or even slightly increasing the species' populations.

Conceptual management actions include the future management of public use programs to ensure the protection of all listed species. During CCP development, the Service would consider such tools as the establishment of use restrictions (time and space) and buffer zones around sensitive endangered species areas and the re-routing of trails to reduce impacts to species that may be sensitive to human activities.

To minimize human disturbance to sensitive species, public recreation opportunities could also include staff guided and unguided public hiking trails and wildlife photography along suitable areas of the Kilauea River and the Falls. Trails would be designed to avoid sensitive endangered species habitats while affording opportunities for wildlife observation and interpretation. Additional plans could potentially allow other compatible wildlife-dependent recreation.

The Service's experience in managing endangered species wetland and seabird habitats shows that the threat from nonnative predators to native wildlife can be mitigated using

various wildlife management methods. Controlling rats, bullfrogs, and cattle egrets would be a priority. In addition, public outreach efforts would be conducted to help raise awareness regarding the detrimental effects of feral and free-ranging cats and dogs on native wildlife, especially ground nesting birds. Bullfrogs are especially known to be voracious stilt chick predators (Robinson 1999). Trapping and controlling bullfrogs would likely be an ongoing management activity with surveys conducted to monitor and assess the effectiveness of control. Monitoring the presence of mongoose is an important Refuge management action as mongooses have become a serious threat to waterbirds on other Hawaiian islands. As of yet, Kaua‘i does not have an established mongoose population. Credible sightings of mongooses have occurred on Kaua‘i, therefore, vigilance is required to keep these harmful predators from establishing a population in this area.

Hawaiian Duck or Koloa –The Service's recovery goals for the Koloa make establishing additional self-sustaining populations on the north shore of Kaua‘i a high priority (USFWS 2005). Habitat management proposed in Alternative D would support the Service's recovery plan goals for this species by adding important protected Koloa habitat – within a geographical area that contains perhaps the last stronghold of the pure strain of Koloa (Zaun 2005).

Conceptual management actions include restoration and development of approximately 15 acres of managed wetlands to provide the Koloa with additional foraging, loafing, and nesting habitat in the Kilauea River Valley. Protection and enhancement of fast moving streams and associated wetland habitat further upstream of these wetlands is also an important consideration associated with this proposed expansion to provide prime nesting and foraging habitat for the Koloa.

The Service would consider rotating seasonal treatments of wetland management units to provide food resources and cover for Koloa on a year-round basis. Drying, mowing, discing, tilling, and flooding are treatments used to maximize the production of necessary invertebrate prey species and life cycle requirements for Koloa. These managed wetlands and uplands could provide increased production of plant material and invertebrates for foraging and the necessary vegetative cover for nesting and predator avoidance.

Long-term population monitoring would be conducted by Refuge biologists to evaluate the recovery of the Hawaiian Duck in response to natural resource management actions. This monitoring would provide the basis for evaluating the effects of Refuge management actions such as habitat management, law enforcement, predator control efforts, and visitor use, on Refuge species and their habitats as well as the surrounding environment. These actions will be addressed in further detail when the Service initiates the Refuge's CCP, scheduled to begin in 2007.

The "Second Draft Revised Recovery Plan for Hawaiian Waterbirds" (Recovery Plan) (USFWS, 2005) identifies hybridization with Mallards as a threat to the continued existence of the Hawaiian Duck. The Service would consider focusing Refuge

management on minimizing further genetic dilution of the pure Koloa strain by careful monitoring and removal of feral Mallards and hybrid ducks from the vicinity.

Hawaiian Stilt or Ae‘o – The population recovery goal for this federally-listed threatened species has been set at 2,000 breeding birds on at least three different islands for at least 10 years. The Recovery Plan calls for the protection and restoration of additional wetlands such as those in the Kilauea River valley. Under Alternative D, the Service would consider restoring approximately 15 acres of wetlands to support the recovery of all four Hawaiian waterbirds, including the Hawaiian Stilt. Stilts have not been observed on the site, but as occurs with other restored and managed wetlands in the State, the restoration of this area is expected to attract this species as a breeding resident.

Conceptual management actions being considered for this species include the development and management of least 5 acres of moist soil units maintained specifically for Stilt nesting and chick foraging habitat. These managed wetlands would provide the ability to control water levels to provide shallow flooded ponds with numerous nesting islands needed for predator avoidance. Optimal chick foraging areas could also be provided with water levels less than 4-5 inches and adequate mudflats for invertebrate feeding opportunity.

Long-term population monitoring would be conducted by Refuge biologists to evaluate the recovery of the Hawaiian Stilt and the other endangered waterbirds in response to natural resource management actions. This monitoring would provide the basis for evaluating the effects of Refuge management actions such as habitat management, law enforcement, predator control efforts, and visitor use. These actions would be further addressed in the Refuge’s CCP scheduled to begin in 2007.

Hawaiian Coot or ‘Alae ke‘oke‘o – The Hawaiian Coot is considered a full species and is listed as endangered on the Federal endangered species list. Hawaiian Coots have been seen in the open water of the Kilauea River mouth area. Conceptual management actions might entail protecting an additional 15 acres of open water and estuarine habitat for use by this species. The 15 acres of wetland proposed for development and management as moist soil management units would provide high quality nesting, foraging and roosting habitat for this species.

Hawaiian Moorhen or ‘Alae ‘ula – Kaua‘i is one of only two main Hawaiian Islands that support Hawaiian Moorhen populations. This threatened species is generally sedentary in nature. Refuge expansion and management could establish a protected area to support a new or expanded population in the Kilauea River Valley. Approximately 15 acres of restored wetlands (moist soil management units) could provide suitable habitat for Moorhen nesting, foraging, and predator cover. Management actions could also provide the Moorhen with dense emergent vegetation over shallow water less than 2 feet deep for optimal nesting habitat.

The Recovery Plan calls for the protection and restoration of additional wetlands such as those in the Kilauea River Valley. Refuge expansion and management could potentially

allow for developing and managing approximately 15 acres of wetlands as moist soil management units to provide foraging and nesting areas for the benefit of moorhens. In addition to the managed wetlands, the Service would consider restoring approximately 10 acres of riparian habitat between two wetland areas that will provide additional roosting habitat and a buffer from potential human disturbance.

Hawaiian Goose or Nene – the Refuge and Hanalei National Wildlife Refuge are target areas for the recovery of the Nene. The Recovery Plan calls for a population goal of 500 breeding adult birds. Currently, the population estimate for the Refuge and Hanalei National Wildlife Refuge is 250-300 breeding adults, over half the identified goal. The first priority of the Nene Recovery Plan for Kaua‘i is to create and maintain new populations. The second priority is to increase the population size throughout Kaua‘i’s north shore. Refuge expansion could support both these goals by managing approximately 30 additional acres of grassland habitat for Nene foraging and nesting.

Conceptual management actions include maintaining 20-30 acres in short grass for foraging habitat interspersed with native shrubs for nesting and predator cover.

The Service would also consider restoring nearby wetland habitat for the endangered waterbirds to provide the Nene with nesting habitat and foraging areas on the mowed perimeter dikes. Approximately 3 acres of riparian habitat, connecting the two restored wetland areas, would provide additional foraging and nesting habitat for Nene.

An expanded Nene population in the Kilauea River Valley could be managed and protected by the Service to create a relatively safe haven for Nene by conducting routine population monitoring and predator management, as needed.

Newell’s Shearwater or ‘A‘o – Although not currently using the proposed expansion area, Newell’s Shearwater may nominally benefit from restoration efforts for Wedge-tailed Shearwaters. Native habitat restoration along coastal bluffs would provide some potential nesting areas for this species. Conceptual management actions include removing nonnative tall trees (along with other invasive plants) and restoring the area with native low lying shrubs, to create unfettered flyways to the upper bluff area for seabird nesting habitat. Predator control might help increase the likelihood that this species would stabilize and possibly even increase its breeding population in the area.

Hawaiian Monk Seal or ‘Ilio holo i ka uaua –Refuge expansion would help protect haul out/resting areas for the endangered Hawaiian monk seal at both Kahili and Kauapea Beaches (adjacent to parcels 2, 4, and 5). Monk seals have been documented at both these beaches. At the Refuge, monk seals commonly use the cove located directly below the Refuge administrative area (referred to as East Cove). These animals may be the same ones that use these other nearby beaches, located only a couple of kilometers from the cove.

Under Alternative D, the Service would protect endangered monk seals and their habitats via patrols by Refuge law enforcement officers. Increased presence of law enforcement

officers would help eliminate the illegal use of off-road vehicles on dunes and beaches. Also, the illegal camping that occurs on the lower slopes of Parcels 2 and 5, and throughout Parcel 4 would be eliminated and a no camping policy would be enforced. Beach goers would still be welcome to use the public beach, although they would be required to comply with laws that protect endangered and threatened species.

Green Sea Turtles or Honu –Refuge expansion would help protect nesting and haul out areas for the threatened green sea turtles on both Kahili and Kauapea Beaches. There is documented nesting of green sea turtles on the beach adjacent to Parcel 5 and undocumented reports of nesting on Kahili Beach. Documented green sea turtle nesting has occurred within 2 kilometers to the east of Kahili Beach (D. Heacock DLNR pers. comm. 2006).

The Service would consider employing the same law enforcement presence and restrictions of off-road vehicles and camping for nesting green sea turtles that the Service is using to protect monk seals, as discussed above.

Hawaiian Hoary Bat or ‘Ope‘ape‘a – The endangered Hawaiian hoary bat has been commonly observed foraging over Kahili Bay and the Kilauea River. Threats to the recovery of the Hawaiian hoary bat include loss of habitat and effects from pesticide use. Refuge expansion would help protect roosting areas in the forested portions of Parcel 3. These bats are known to roost in untrimmed trees that provide suitable cover (such as the hanging dead branches of untrimmed coconut palms). Protection of the Kilauea River Valley as a national wildlife refuge would maintain suitable habitat and provide an insect prey base.

4.2.2.2 Other Native Species

Under Alternative D, the Service proposes to protect 202 acres of undeveloped habitat, in large part, to protect specific wildlife habitats. In addition to endangered species, Alternative D could also support the native seabird species of the Hawaiian archipelago. The coastal bluffs situated to the east of the current Refuge boundary, although not presently used for seabird nesting, have potential for use as nesting habitat for an array of native seabirds that nest at the adjacent Refuge. Species observed nesting or roosting at Kilauea Point include Laysan Albatross, Red and White-tailed Tropicbirds, Red-footed Boobies, and both Wedge-tailed and Newell’s Shearwaters.

Maintenance of grasslands for use by Nene would provide Laysan Albatross with potential nesting areas. In developing the Refuge CCP, the Service would also consider management actions such as tree and brush removal, mowing, and predator protection, activities which would also benefit Laysan Albatross and Pacific golden Plover.

Conceptual management includes enhancement of potential seabird nesting habitat by removing nonnative trees to provide clear access to cliff banks for nesting. Nonnative ironwood trees, common to these coastal bluffs, could be removed (with root systems left

for cliff stabilization) and replaced by native shrubs such as naupaka (*Scaevola sericea*), ‘akoko, pohuehue, and ‘ilima (*Sida fallax*).

In developing the Refuge CCP, the Service would also consider removing nonnative predators such as rats, mice, cats, and dogs to increase the likelihood of seabird nesting success. Public outreach efforts could be focused on educating the public about the negative effects free-ranging domestic pets can have on nesting seabirds.

4.2.3 Habitat Protection and Open Space Preservation

Alternative D proposes to establish Federal protection for the widest array of natural habitats associated with the expansion area, many of which do not exist within the current Refuge boundary. If Alternative D were adopted, protected habitats would include: coastal dunes (5 acres), ocean bluff (20 acres), brackish wetlands/marsh (34 acres), riparian (21 acres), lowland forest including nonnative shrub (65 acres), inland cliff face (5 acres), grasslands (35 acres), and aquatic habitats (17 acres), including both estuary and river.

The ocean bluff habitat is vegetated with mostly exotics including ironwood, false kamani, lantana, and nonnative grasses. The bluffs also contain scattered coconut palms and a few native hala and milo trees. Over time, the Service may consider converting the ocean bluffs to native species. Restoring low-stature coastal trees and shrubs would improve nesting habitat for seabirds by providing unimpeded landing areas on the bluffs. Restoration would be accomplished as Refuge staff, funding, and volunteers become available.

These bluffs include a microhabitat called “cliff face seeps,” a type found only in this northern quadrant of Kaua‘i from Princeville to Moloa‘a. These seeps develop where naturally occurring water drains out through rock cliff. The seeps provide habitat for native sedges, crustaceans, and damselflies. Under Alternative D, the Service would be able to protect this rare habitat type and the native species that occupy them in perpetuity.

The Service, under Alternative D, proposes to add approximately 5 acres of coastal dune habitat to the Refuge. This habitat currently exists in a degraded state, due to extensive coverage by exotic vegetation. Conceptual management for the area includes the possibility of removing invasive plants and restoring the area with native coastal dune vegetation using staff and volunteer time. Community volunteer efforts could range from native habitat restoration to environmental and cultural education, accomplished in partnership with the Kilauea Land Trust, the Kilauea Neighborhood Association, the Hanalei Hui, and other community organizations.

Conceptual management for the dunes includes restoration of the habitat by removing nonnative trees and shrubs including ironwood, Christmasberry, and lantana. Habitat restoration could involve planting with native species such as naupaka, hala, ‘akia (*Wikstroemia uvaursi*), pohuehue, and ‘ilima. Consultation and assistance from local Hawaiian elders would be sought to ensure proposed projects reach their full potential

with regard to Hawaiian culture, native wildlife, and the community of Kilauea. The concept is to have these projects provide an area those local schools and community organizations could visit to conduct environmental and cultural education.

Riparian habitat is restricted to the strip of land directly adjacent to Kilauea River. This area is covered with invasive vegetation, mainly hau bush. Conceptual management for the riparian zone includes removal of large monotypic stands of hau bush and restoration with native riparian species.

The lowland forest of the Kilauea Valley is almost entirely composed of nonnative vegetation and inhabited by many nonnative species of birds and mammals. The Service is considering native lowland forest restoration in manageable sections, as staff and funding become available. Within the stands of nonnative vegetation are large conspicuous stands of invasive bamboo. Heavy equipment would be needed to remove bamboo. Native trees the Service would consider planting would be the lowland koaiʻa (*Acacia koaia*), ʻohiʻa (*Metosideros polymorpha*), lama (*Diospyros sandwicensis*), and pokalakala (*Munroidendron racemosum*). Shrubs such as alula (*Brighamia insignis*), kokiʻo keʻokeʻo or white hibiscus (*Hibiscus waimeae* ssp. *hannerae*), and iliau (*Wilkesia gymnoxiphium*) could be interspersed with trees to replace these bamboo stands and other nonnative vegetation.

Terrestrial habitat restoration would be conducted using best management practices to minimize soil erosion and sedimentation into the Kilauea River. The absence of development and the use of best management practices would maintain a high level of water quality in both the Kilauea River and Kahili Bay – a popular spot with beach goers.

The Refuge would work with the State Department of Land and Natural Resources – Aquatic Resources to develop a management plan to protect and enhance the aquatic environment of this section of the River.

Conceptual management actions for Kilauea River habitat restoration include removing exotic vegetation along the riparian edge where the stream is shaded from sunlight. The removal of shade trees would increase water temperature, invertebrate populations, and photosynthesis to benefit native species.

Conceptual plans are to establish native wetlands along the Kilauea River, either by planting native plants or by natural recruitment by brackish water flooding, to help filter pesticides, fertilizers, and silt run-off into the River.

Proposed management actions would entail working with the State to devise management plans to control nonnative predator fish species such as introduced small and large-mouthed bass, swordtails, and koi to benefit native fish species.

Stream surveys would be conducted for sensitive aquatic species such as gobies, snails, shrimp, and fresh water mollusks. Protection of habitat for sensitive species would also

be protective of other native aquatic species, such as commercially important fish species that use the estuary as a nursery.

Restoration of the lowland, coastal, riparian and cliff areas to natural plant communities would be a priority to the Service for the Refuge expansion area. Because habitat restoration would be conducted on a relatively small scale over time and the adverse effects of habitat restoration would be minimized due to adoption of best management practices, it is not anticipated that effects of habitat restoration activities being considered would result in significant environmental changes.

4.2.4 Effects on the Social and Economic Environment

In this section, the Service examines the environmental consequences of implementing Alternative D for cultural resources and recreation and tourism.

4.2.4.1 Cultural Resources

Implementation of Alternative D would result in Federal protection of cultural resources in the proposed expansion area through Service compliance with Federal cultural and historic resource laws and policy. The addition of the lands to the Refuge would allow the Service to include these areas in CCP planning which will address the treatment, protection, research, and interpretation of cultural and historic sites in coordination with the State Historic Preservation Office and members of the public.

Habitat restoration, including the coastal dune project, would be planned and carried out in consultation with local Hawaiian elders (through assistance by the Kilauea Neighborhood Association or Office of Hawaiian Affairs) to ensure that cultural sites important to native Hawaiians are protected to the maximum extent possible.

During CCP planning, the Service would work with members of the community to evaluate opportunities for native traditional gathering on the Refuge. Public uses would need to be compatible with Refuge purposes and consistent with all applicable laws. Because the Service would consult on activities with the potential to affect cultural resources and adopt protection measures to ensure cultural resources are not adversely affected, no significant effects to cultural resources are expected to occur.

4.2.4.2 Recreation and Tourism

Under Alternative D, the Service could facilitate expanded opportunities for environmental education and community-based environmental stewardship. Conceptual management actions for public recreation include staff guided and unguided public access hiking trails and wildlife observation and photography along suitable areas of the Kilauea River and Kilauea Falls. Trails would be designed to avoid sensitive endangered species habitat while affording opportunities for wildlife observation and photography, environmental education and interpretation, and fishing on the lower estuarine portion of the River during daylight hours. To accommodate fishing, the Service would consider

allowing continued use of an existing gravel boat launch maintained for public use and developing a fishing access point for physically challenged people, as part of the CCP planning process.

It is likely that guidebooks, trade publications, and word-of-mouth would result in increased visitation to newly acquired areas as Kilauea River Valley is well-known as a tourist destination. Refuge management would strive to manage the area for low impact, low volume public use. Parking and access roads are limited and would be the primary limiting factor to increased public use, therefore, the Service would likely conduct the minimal improvements required for public safety. During the CCP planning process, a range of alternative means of managing visitor use would be considered. Public use would need to be managed by the Service in a manner compatible with the proposed purposes for which the Refuge is being expanded.

The Service would consider allowing guided tours that could include swimming in the pool below Kilauea Falls, as part of the tour. Unrestricted swimming in the pools (outside of the designated tours) would likely be prohibited due to safety and liability concerns.

Allowing commercial activities on these newly acquired properties may not be feasible due to insufficient infrastructure of roads and parking areas to support commercial activities. Due to the need to minimize human disturbance for endangered species recovery efforts and to minimize the negative impacts to the local community from anticipated increased visitation, it may not be feasible for the Service to allow private enterprises to conduct activities such as kayaking or hiking tours.

The consequences of increased Refuge visitation on the local community are likely to be minimal in terms of spending associated with Refuge visitation causing positive economic benefit, for the local community, and in terms of a negative increase in traffic congestion.

As part of a separate project, the Service is taking part in an Alternative Transportation Study (ATS) for access to the Refuge, in order to meet the needs of the local community while providing the highest quality Refuge visitor experience. In planning an ATS, managers will consider the potential effects of a new transportation system on community residents, visitor access, visitor experience, visitor willingness to pay for specific services such as a shuttle, and net economic benefits resulting from visitation. As part of the ATS project, the Service contracted a study that was conducted by the U.S. Geological Survey's Policy Analysis and Science Assistance Branch (PASA) in 2004 to study the above factors.

One objective of the PASA study was to determine the impacts of visitor spending within the local area. This study found that for 56 percent of Refuge visitors, visiting the Refuge was either the primary reason for coming to Kaua‘i or equally important as other reasons for visiting Kaua‘i. This statistic agrees with the outcome of another visitor questionnaire where 56 percent of 1,346 respondents said that wildlife/plant viewing was their main

reason for coming to Kaua‘i. The PASA study found that Refuge visitors spent between $1,026 and 1,070 total per person per trip to Kaua‘i ($127-133 per day). Based on a 2004 model, the PASA study concluded that both the direct (visitor spending within the economy) and indirect effects of Refuge visitors coming to Kaua‘i County (income and employment resulting from secondary purchases such as rooms, cars, gas, restaurants, groceries, etc.) equaled $8.9 million per year and 184 jobs (Sexton et al. 2005).

Community responses to the PASA survey included concerns regarding increased tourism to Kilauea because of increased traffic with associated noise and traffic safety issues. Additional community concerns were voiced about increased Refuge tourism during a Kilauea Neighborhood Association meeting held in June 2005.

Visitor use is expected to be managed at levels well below that which is permitted at the Kilauea Point lighthouse area. Thus, the Service expects that future visitor use programs at the Kilauea Stream area would not result in significant effects on traffic, noise, or economics of the local community.

4.2.5 Other Effects

This section covers long-term biological productivity and diversity, unavoidable adverse effects, cumulative impacts, and the rationale for identifying Alternative D as the preferred alternative. Also included is a table comparing the anticipated environmental consequences associated with each alternative.

4.2.5.1 Long-term Conservation of Biological Productivity and Diversity

Under the proposed expansion in Alternative D, the Service would protect and manage the wildlife habitat of the area as a permanent part of the Refuge System, restoring and conserving native biological diversity. Long-term productivity includes protection and restoration of federally-listed threatened and endangered species populations and other native terrestrial and aquatic species, including rare plant communities.

4.2.5.2 Unavoidable Adverse Effects

Adoption of Alternative D would not result in unavoidable adverse effects but would instead protect the area from incremental adverse impacts from development such as degradation of water quality and loss of wildlife habitat.

4.2.5.3 Cumulative Impacts

The proposed action, Alternative D, would expand the Refuge by up to 202 acres and would result in additional habitat being protected, restored, and managed in perpetuity. The Service would manage the additional Refuge lands to provide for recovery of endangered Hawaiian waterbirds; long-term conservation of valuable coastal wildlife habitat; preservation of water quality in the lower reaches of the Kilauea River Valley and associated Kahili Bay; protection of cultural resources; and opportunities for

wildlife-dependent public recreation, community stewardship, and environmental education. The effects would generally be restricted to the project area. Some species of wildlife would migrate from the Refuge to other areas. The effects of the wildlife movements are not likely to be significant because the Service is not anticipating significant increases in wildlife populations. Furthermore, in the context of Kauai's continuing population growth, island development and associated habitat degradation, expansion of the Refuge in an area that is currently undeveloped does not represent a significant cumulative impact on the human environment.

4.3 Comparison of the Alternatives and Rationale for the Preferred Alternative

In this section, a matrix provides a side by side comparison of the alternatives in Table 5 followed by a discussion of the rationale for the preferred alternative, Alternative D.

Table 5. Environmental Consequences Comparison

Environmental Factor:	**Alternative A** No Action	**Alternative B** Coastal	**Alternative C** Riverine	**Alternative D** Coastal and Riverine
Federally listed endangered and threatened species	No changes in habitat conditions for listed species.	Limited additional roosting/foraging habitat for endangered Hawaiian hoary bat. Maximum potential nesting habitat for threatened Newell's Shearwater protected in perpetuity. Additional protected habitat for endangered Hawaiian monk seal and threatened green sea turtle.	Maximum additional managed wetlands for Hawaiian waterbirds Maximum protection of roosting/foraging habitat for Hawaiian hoary bat Maximum additional habitat for Nene No additional nesting habitat for Newell's Shearwater Less protected habitat for monk seals and sea turtles compared to Alternative B	Maximum additional managed wetlands for Hawaiian waterbirds Maximum protection of roosting/ foraging habitat for Hawaiian hoary bat Maximum additional habitat for Nene Additional potential for Newell's Shearwater nesting habitat Maximum additional protected habitat for Hawaiian monk seal and green sea turtle
Native Seabirds	Potential degradation of cliff habitat due to land development	Protection for majority of potential seabird nesting areas on both coastal bluffs	Limited protection of seabird nesting	Protection for seabird nesting areas on eastern coastal bluffs and inland cliff faces
Native Plant communities	Potential loss due to land development and invasive species	Limited diversity of protection	Protection of all native plant communities except for cliff face seeps on coastal bluffs	Maximum protection of native plant communities
Aquatic resources	Possible degradation due to development	Limited protection at basal cliff areas	Maximum protection of riverine and estuary aquatic resources	Maximum protection of aquatic resources
Additional protected habitat (acres)	0	55	179	202

Environmental Factor:	**Alternative A** No Action	**Alternative B** Coastal	**Alternative C** Riverine	**Alternative D** Coastal and Riverine
Cultural Resources	Potential loss due to land development	Limited additional protection for cultural resources	Protection for majority of cultural resources	Maximum protection for cultural resources
Public Recreation	No changes in public recreation opportunities	Limited additional wildlife-dependent public recreation opportunities	Maximum additional wildlife-dependent public recreation opportunities	Maximum additional wildlife-dependent public recreation opportunities
Tourism	No anticipated increase in the proposed expansion area	Limited additional tourism opportunities	Increase from guided hikes and Kilauea Falls visitation	Increase from guided hikes and Kilauea Falls visitation

4.3.1 Rationale for Selection of the Preferred Alternative

The No Action Alternative provides little likelihood important wildlife habitats would be protected, restored, and managed.

Alternatives B (coastal) and C (riverine) each encompass important wildlife habitat identified for protection. Thus, with the selection of Alternative D as the Preferred Alternative, including the distinct and complementary habitats of both Alternatives B and C, the Service could protect the widest variety of habitats for endangered species, seabirds, shorebirds, raptors, aquatic resources, and other native wildlife. The Service could protect the most cultural resources under Alternative D as well. Additionally, the Service would have the greatest opportunity to offer wildlife-dependent public recreation to local residents and visitors under Alternative D.

Parcel 5 (Alternative B) was excluded from Alternative D, the Preferred Alternative, due to unresolved controversy and legal questions concerning public access.

More specifically, Alternative D has been identified as the Preferred Alternative because implementing it would provide the greatest opportunity to:

- Contribute to the purpose and need for expanding the Refuge, protecting the widest diversity of wildlife habitat types associated with the study area and the adjacent Refuge.

- Contribute to the goals of the National Wildlife Refuge System to benefit present and future generations of Americans.

- Support the goals of the 2005 Recovery Plan for Hawaiian Waterbirds by providing foraging, roosting, and nesting habitat for four endangered waterbird species: the Hawaiian Duck, Hawaiian Moorhen, Hawaiian Coot, and Hawaiian Stilt as well as grassland habitat for the federally-listed endangered Nene.

- Protect nesting habitat for seabirds including the federally-listed threatened Newell's Shearwater.

- Protect roosting and foraging habitat for the federally-listed endangered Hawaiian hoary bat and coastal habitat for the federally-listed endangered Hawaiian monk seal and federally-listed threatened green sea turtle.

- Protect grassland habitat for the native Laysan Albatross and various raptor species.

- Protect cliff face seeps that support sedges, crustaceans, and damselflies endemic to this part of the island of Kaua'i.

- Protect coastal strand dune and the variety of native coastal dune vegetation.

- Protect riverine habitats along the Kilauea River Valley from Kilauea Falls to the rivermouth at Kahili Bay including wetlands, riparian woodlands, forest, marshes, streams, and estuary. These habitats support estuary–dependent fish, mollusks, crustaceans, and invertebrates; nesting habitat for the White-tailed Tropicbird; and native lowland forest birds.

- Contribute to protecting water quality within the Kilauea River Valley to improve watershed health and function by protecting and restoring patches of native habitat.

- Provide high-quality wildlife-dependent recreation and environmental education to enhance public appreciation, understanding, and enjoyment of the Refuge's fish, wildlife, and plant habitats.

- Collaborate in the protection of Native Hawaiian cultural resources and provide public cultural resource education.

- Prevent further encroachment and disturbance to existing Refuge wildlife.

CHAPTER 5. COORDINATION, CONSULTATION, AND COMPLIANCE

5.1 Public Involvement

The proposed expansion of the Kilauea Point National Wildlife Refuge has been discussed with landowners; neighbors; conservation organizations; Federal, State, County, and city governments; local organizations and interested groups; and individuals.

The Service has invited and continues to encourage public participation throughout the public involvement process consisting of public notices and meetings with potentially affected landowners, government agencies, private organizations, and individuals. The Refuge Manager gave a presentation on June 7, 2005, at a Kilauea Neighborhood Association meeting. Planning updates were distributed in May and November of 2005.

As part of the public notice and review process, the *Kilauea Point National Wildlife Refuge Draft Land Conservation Plan and Environmental Assessment* will be available for a minimum 30-day review and comment period from the date of public release. A public open house will be held during the 30-day comment period in the town of Kilauea, Hawaii, where Service employees will be available to discuss the project, answer questions and receive public comments. A notice for the meeting can be found in Planning Update 3.

5.2 Environmental Review and Consultation

In expanding the Refuge, the Service would comply with Federal laws, regulations, and executive orders. The following section describes specifically how expanding the Refuge is in compliance with the NEPA, National Historic Preservation Act, Endangered Species Act, and other relevant Federal laws, regulations, and Executive Orders.

5.2.1 National Environmental Policy Act

As a Federal agency, the Service must comply with provisions of the 1969 National Environmental Policy Act (NEPA), as amended (42 U.S.C. 4321-4347). An environmental analysis is required under NEPA to evaluate reasonable alternatives that will meet stated objectives, and to assess the possible environmental, social, and economic impacts to the human environment. The environmental assessment serves as the basis for determining whether implementation of the proposed action would constitute a major Federal action significantly affecting the quality of the human environment. The environmental assessment facilitates the involvement of government agencies and the public in the decision making process.

5.2.2 National Historic Preservation Act

The Service would follow established procedures for protecting cultural resources if the Refuge is expanded. This includes complying with the National Historic Preservation Act of 1966 (16 U.S.C. 469) and other cultural resource preservation laws, and consulting with the State Historic Preservation Office and appropriate Native American governments for any future restoration and management actions which may have the potential to affect historic properties.

5.2.3 Endangered Species Act

Expanding an approved refuge boundary does not represent a Federal action which would affect species listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544). The Service would conduct consultation under Section 7 of the Endangered Species Act for any Refuge management program actions which have the potential to affect listed species.

5.2.4 Other Federal Laws, Regulations, and Executive Orders

In implementing the proposed action, the Service would comply with the following Federal laws, executive orders, and legislative acts: Intergovernmental Review of Federal Programs (Executive Order 12372); Protection of Historical, Archaeological, and Scientific Properties (Executive Order 11593); Floodplain Management (Executive Order 11988); Protection of Wetlands (Executive Order 11990); Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. 9601 et seq.); Management and General Public Use of the National Wildlife Refuge System (Executive Order 12996); Departmental Policy on Environmental Justice (Executive Order 3127); Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended; Refuge Recreation Act of 1962, as amended; National Wildlife Refuge System Administration Act of 1966, as amended; and Consultation and Coordination with Indian Tribal Governments (Executive Order 13175).

5.2.5 Distribution and Availability

Copies of this LCP/EA have been distributed to Federal and State elected officials, Native groups, County and city governments, affected landowners, private groups, and other interested individuals (see Appendix B, Notification List). Copies of the document are available by contacting the U.S. Fish and Wildlife Service, Division of Planning and Visitor Services, 911 N.E. 11th Avenue, Portland, OR 97232, (503) 231-2235. The documents can also be viewed on the Service's website at http://pacific.fws.gov/pacific/planning.

CHAPTER 6. REFERENCES

Aiken, R.R. 1988. *Kilauea Point Lighthouse, The Landfall Beacon on the Orient Run*. Kilauea Point Natural History Association. Kauai, HI, pgs. 14-19.

American Ornithologist's Union. 1993. Checklist of North American Birds. 7th edition. American Ornithologists' Union, Washington, D.C.

Beletsky, L. 2000. Ecotravellers' Wildlife Guide to Hawaii, Natural World Academic Press, San Diego, CA, pgs. 166-169.

Bennett, W.C. 1931. Archaeology of Kaua'i. Bishop Museum Bulletin No. 80. Bishop Museum Press. Honolulu, HI, pg. 16.

Blay, C. and Siemers, R. 2004. Kauai's Geologic History, A Simplified Guide (Updated Edition), The Edge of Kauai Investigations, Honolulu, HI, pg. 51-54.

Brisbin, I.L., H.D. Pratt, and T.B. Mowbray. 2002. American Coot and Hawaiian Coot. *In* the Birds of North America, No. 697 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Burgett, B., McGerty, L., and Spear, R. L. 2000. An Archaeological Inventory Survey of an approximately 27.56 acre parcel, Kahili Ahupua'a, Ko'olau District, Island of Kaua'i, Hawaii [TMK 5-2-21-:6]. Prepared for Cheryl Schenck.

Burney, D.B. 2001. Fossil Evidence for a Diverse Biota from Kauai and Its Transformation since Human Arrival. Ecological Monographs 71: 615-641.

Byrd, G.V., J.L. Sincock, T.C. Telfer, D.I. Moriarity, and B.G. Brady. 1984. A cross-fostering experiment with Newell's race of Manx shearwater. J. Wildl. Manage. 48(1):163-168.

Byrd, G.V. and Zeillemaker, C.F. 1981. Ecology of nesting Hawaiian common gallinules at Hanalei, Hawaii. Western Birds 12:105-116.

Chang, P.R. 1990. Strategies for managing endangered waterbirds on Hawaiian National Wildlife Refuges. M.S. Thesis, University Massachusetts, Department of Forestry and Wildlife Management, Amherst MA. 87 pp.

Coleman, R.A. 1981. The reproductive biology of the Hawaiian subspecies of the black-necked stilt, *Himantopus mexicanus knudseni*. Ph.D. dissertation, Pennsylvania State University, PA. 106 pp.

Engilis, A., Jr., Uyehara K.J., and Giffin, J.G. 2002. Hawaiian Duck (*Anas wyvilliana*). *In* The Birds of North America, N. 694 (A. Poole and F. Gill, eds.) The Birds of North America, Inc. Philadephia, PA.

Finney, B. 2003. Sailing in the Wake of the Ancestors, Reviving Polynesian Voyaging. Bishop Museum Press, Honolulu, HI. 124 pp.

Heacock, D. 2006. District Biologist, Hawai‘i State Department of Land and Natural Resources, Division of Aquatic Resources, Kaua‘i, HI. Personal communication regarding green sea turtle nesting east of Kahili Beach.

Hawai‘i Division of Forestry and Wildlife. 1976-2003. Biannual Hawaiian waterbird survey data. Summarized by Hawaii. Natural Heritage Program and Pacific Islands Fish and Wildlife Office, Honolulu, HI.

Henshaw, H.W. 1902. Birds of the Hawaiian Possessions. T.G. Thrum Publisher, Honolulu, HI. pp.146.

Kane, H.K. 1997. Ancient Hawaii. Kawainui Press, Captain Cook, HI. 10 pp.

Kirsh, P.V. 1982. The Impact of Prehistoric Polynesians on the Hawaiian Ecosystem. Pacific Science 36(1):1-14.

Nagata, S.E. 1983. Status of the Hawaiian Gallinule on lotus farms and a marsh on Oahu, Hawaii. M.S. thesis, Colorado State University, Fort Collins, CO.

Pratt, H.D., et al. 1987. The Birds of Hawaii and the Tropical Pacific, Princeton University Press, Princeton, NJ, pg. 56-57.

Robinson, J.A., Reed J.M., Skorupa J.P., and Oring, L.W. 1999. Black-necked stilt (*Himantopus mexicanus*). *In* The Birds of North America. No. 449 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 32pp.

Schwartz, C.W. and Schwartz E.R. 1949. The Game Birds of Hawai‘i. Division of Fish and Game and Board of Commissioners of Agriculture and Forestry, Honolulu, HI. pg. 168.

Sexton, N., S.C. Gillete, L. Koontz, S.C. Stewart, J. Loomis, and K. Wundrock. 2005. Visitor and Community Survey Results for Kilauea Point National Wildlife Refuge and Lighthouse: Completion Report, U.S. Department of the Interior, U.S. Geological Survey. 3-1 thru 3-5 pgs.

Shallenberger, R.J. 1977. Ornithological survey of Hawaiian wetlands. U.S. Army Corps of Engineers Contract DACW 84-77-C-0036, Honolulu, HI 406 pp.

Smith, D.G., and J.T. Polhemus. 2003. Habitat use and nesting activity by the Hawaiian stilt (*Himantopus mexicanus knudseni*) and Hawaiian moorhen (*Gallinulla chloropus sandvicensis*) at the Hamakua Marsh State Wildlife Sanctuary, Kailua, Oahu. ‘Elepaio 63:59-62.

State of Hawai‘i, Department of Land and Natural Resources. 1990. Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii’s Stream Resources. Commission on Water Resource Management. Honolulu, HI.

Swedberg, G.E. 1967. The Koloa, a preliminary report on the life history and status of the Hawaiian duck (*Anas wyvilliana*). Federal Aid to Wildlife Restoration Act Report (W-5-R), Department of Land and Natural Resources, Division of Fish and Game, Honolulu, HI. 56 pp.

Thrum, Thomas G. 1907. Heiau and Heiau Sites throughout the Hawaiian Islands. Hawaiian Almanac and Annual for 1907. Honolulu, HI.

U.S. Department of Agriculture. 1972. Soils Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii. Soil Conservation Service. Honolulu, HI.

U.S. Fish and Wildlife Service. 2005. Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision. Portland, OR.

Zaun, B., Refuge Biologist, Kaua‘i National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, Kaua‘i, HI. 2005 and 2006. Personal communication regarding recovery of the Hawaiian Koloa and Hawaiian Coot observations in the Kilauea River.

Appendix A.
Public Law 108-481

One Hundred Eighth Congress
of the
United States of America
AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the twentieth day of January, two thousand and four

An Act

To provide for the expansion of Kilauea Point National Wildlife Refuge.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the 'Kilauea Point National Wildlife Refuge Expansion Act of 2004.'

SEC. 2. EXPANSION OF KILAUEA POINT NATIONAL WILDLIFE REFUGE.

(a) IN GENERAL- The Secretary of the Interior may acquire by donation, purchase with donated or appropriated funds, or exchange, all or a portion of the land or interests in land described in subsection (b), as depicted on a map on file with the United States Fish and Wildlife Service entitled `Kilauea Point Wildlife Refuge Expansion Area' and dated April 22, 2004.
(b) DESCRIPTION OF LAND- The land referred to in subsection (a) is the following:
(1) Parcel 1, consisting of approximately 12 acres known as the Kilauea Bay property.
(2) Parcel 2, consisting of approximately 40 acres known as the Kilauea Vistas property.
(3) Parcel 3, consisting of approximately 162 acres known as the Kilauea Falls Ranch.
(4) Parcel 4, consisting of approximately 5 acres known as the Kauai Public Land Trust Kahili Beach property.
(5) Parcel 5, comprised of lot 10c of the parcel known as Kilauea Garden Farms, and consisting of approximately 15 acres.
(c) BOUNDARY REVISIONS- The Secretary may make such minor revisions in the boundaries of any of the parcels described in subsection (b) as may be appropriate to facilitate the acquisition of land or interests under subsection (a).

(d) INCLUSION IN REFUGE- Land and interests acquired under this section shall become part of the Kilauea Point National Wildlife Refuge.
(e) MANNER OF ACQUISITION- All acquisitions of land or waters under this Act shall be made in a voluntary manner and shall not be the result of forced takings.
(f) ADDITIONAL PURPOSES- In addition to the purposes of the Refuge under other laws, regulations, Executive orders, and comprehensive conservation plans, the Refuge shall be managed for--

(1) the protection and recovery of endangered Hawaiian water birds and other endangered birds, including the Nene (Hawaiian goose); and
(2) the conservation and management of native coastal strand, riparian, and aquatic biological diversity.

(g) PRIORITY GENERAL PUBLIC USES- Nothing in this Act shall be considered to affect any policy or requirement, under paragraph (3) or (4), respectively, of section 4(a) of the National Wildlife Refuge Administration Act of 1966 (16 U.S.C. 668dd(a)), to treat compatible wildlife-dependent recreational uses as priority general public uses of the Refuge.

SEC. 3. ADMINISTRATION.

(a) IN GENERAL- The Secretary shall administer all federally owned land, water, and interests in land and water that are located within the boundaries of the Kilauea Point National Wildlife Refuge in accordance with--

(1) the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd et seq.); and
(2) this Act.

(b) ADDITIONAL AUTHORITY- The Secretary may, in the administration of the Kilauea Point National Wildlife Refuge, use such additional statutory authority available to the Secretary for the conservation of fish and wildlife, and the provision of opportunities for fish- and wildlife-dependent recreation, as the Secretary determines to be appropriate to carry out this Act.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as may be necessary--

(1) to acquire land and water within the Refuge under section 2(a); and
(2) to develop, operate, and maintain the Refuge.

Speaker of the House of Representatives.

Vice President of the United States and

President of the Senate.

Appendix B.
Notification List for the Environmental Assessment

Federal and State Congressional Offices
U.S. Senators Daniel Inouye and Daniel Akaka
U.S. Congressman Neil Abercrombie and U.S. Congresswoman Mazie Hirono
Governor of Hawaii Linda Lingle
State Senators Gary L. Hooser, Hermina Morita, and Bertha C. Kawakami

Federal Agencies
Marine Mammal Commission

U.S. Department of Agriculture
    Natural Resources Conservation Service

U. S. Department of the Army
    Corps of Engineers

U.S. Department of Commerce
    National Oceanographic and Atmospheric Administration
        Pacific Islands Regional Office
        National Marine Sanctuary Program
        Hawaii Islands Humpback Whale National Marine Sanctuary
        National Marine Fisheries Service

U.S. Department of the Interior
    U.S. Fish and Wildlife Service
    U.S. Geological Survey
        Biological Research Division

U.S. Environmental Protection Agency

Native American Governments
Department of Hawaiian Homelands
Office of Hawaiian Affairs

State of Hawaii Agencies
Department of Land and Natural Resources
    Aquatic Resources Division
    Division of Forestry and Wildlife
State of Hawaii Department of Health
    Office of Environmental Quality Control
Hawaii Department of Agriculture
State Historic Preservation Office
Hawaii Natural Heritage Program

University of Hawaii
Hawaii Department of Business, Economic Development and Tourism

Local Government
County of Kauai - Mayor Bryan Baptiste
County of Kauai Council Services - Bill “Kaipo” Asing, Council Chair

Organizations
Kilauea Point Natural History Association
Kilauea Neighborhood Association
Kilauea Point Historical Preservation Committee
Kauai Public Land Trust
The Nature Conservancy of Hawaii
Pacific Coast Joint Venture
The Hanalei Watershed Hui
Conservation Council for Hawaii
Ducks Unlimited
Earthjustice
Hawaii Audubon Society
Hawaiian Trail & Mountain Club
National Wildlife Refuge Association
Hawaii Conservation Alliance
Sierra Club Hawaii Chapter
The Wildlife Society, Hawaii Chapter
Kauai Invasive Species Committee
Save Our Seas

Media contacts
Kong Radio Group - KQNG
KFMN
KKCR/KKCU
KUAI
KHET – Hawaii Public Television
KGMB-TV
KHNL
KHON-TV
KITV
Associated Press
Hawaii Public Radio
hawaiinews.com
Garden Island News
Honolulu Advertiser
Kauai Beach Press/Kauai Business Report
Environment Hawaii

Private Individuals
Landowners
Private Citizens

Appendix C.
Botanical and Avifauna

Survey of Parcel 3 by Refuge staff and volunteer botanist on 4/21/05

NONNATIVE
Java plum (*Syzgium cumini*)
Guava (*Psidium guajava*)
African tuliptree (*Spathodea campanulata*)
Mango (*Mangifera indica*)
Roseapple (*Syzygium jambos*)
White shrimp plant (*Justicia betonica*)
False kamani (*Terminalia catappa*)
Banana (*Musa* spp.)
Bamboo (*Bambusa* spp.)
Jobe's tears (*Coix lachrymal-jobi*)
Octopus tree or Schefflera (*Schefflera actinophylla*)
Catsclaw (*Caesalpinia decapetala*)
Morning glory
Pluchea (*Pluchea* spp.)
Avocado (*Persea americana*)
Tropic ageratum (*Ageratum conyzoides*)
Basketgrass (*Oplismenus hirtellus*)
Pothos vine (*Epipremnum pinnatum*)
California grass (*Brachiaria mutica*)
Guineagrass (*Panicum maximum*)
Honohono (*Commelina diffusa*)
Bulrush (*Scirpus* spp.)
Water purslane (*Ludwigia octovalvis*)
Heliconia
White ginger *(Hedychium coronarium*)
Umbrella plant (*Cyperus alternifolius*)
Coconut palm (*Cocos nucifera*)
Elephant-ear (*Alocasia microrrhiza*)
Ironwood (*Casuarina equisetifolia*)
Mexican elder (*Sambucus mexicanus*)
Arrowleaf sida (*Sida rhombifolia*)
Hau (*Hibiscus tiliaceus*)
Joee (*Stachytarpheta dichotoma*)
Koa haole (*Leucaena leucocephala*)
Raspberry (*Rubus sieboldii*)
Satin leaf tree (*Chrysophyllum oliviforme*)
Golden fern (*Pityogramma calomelanos*)
Noni (*Morinda citrifolia*)
Christmasberry (*Schinus terebinthifolius*)
Lantana (*Lantana camara*)

NATIVE
Hala (*Pandanus* spp.)
Kulu‘i (*Nototrichium sandwicense*)

Avifauna Survey by Refuge staff on 4/21/05

NATIVE
Hawaiian Short-eared Owl (*Asio flammeus sandwichensis*)
Pacific Golden-plover (*Pluvialis fulva*)
Wandering Tattler (*Heteroscelus incanus*)
Red-tailed Tropicbird (*Phaethon rubricauda rothschildi*)
Great Frigatebird (*Fregata minor*)

NONNATIVE
Cattle Egret (*Bubulcus ibis*)
Common Myna (*Acridotheres tristis*)
Domestic Chicken (*Gallus domesticus*)
Hwamei (*Garrulax canorus*)
Japanese White-eye (*Zosterops japonicus*)
Northern Cardinal (*Cardinalis cardinalis*)
Spotted Dove (*Streptopelia chinensis*)
White-rumped Shama (*Copsychus malabaricus*)
Zebra Dove (*Geopelia striata*)